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**SELECTED ECONOMIC TRANSLATIONS  
ON EASTERN EUROPE**

(154th in the series)

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SELECTED ECONOMIC TRANSLATIONS  
ON EASTERN EUROPE

INTRODUCTION

This is a serial publication containing selected translations on all categories of economic subjects and on geography. This report contains translations on subjects listed in the table of contents below. The translations are arranged alphabetically by country.

TRANSLATIONS

## TABLE OF CONTENTS

	Page
EAST GERMANY	
New Commercial Plastics.....	1
Present Problems of Standardization in the Machine-Tool Industry.....	8
First Standardization Agreement Between the Chamber of Technology and the State Planning Commission.....	30
Highway Construction in the East German Seven-Year Plan.....	38
Report on Shipping Losses in East German Ports.....	45
Current Status and Long-Range Plans for Electri- fication of East German Railroads.....	51
Socialist Work Methods Improve the Work of the East German Railroads.....	62
HUNGARY	
Standardization in Hungary, with Special Attention to Food Products.....	75
Description of the Benzol Recovering Plant and Its Production Results at the Danubian Iron Works.....	80
SUPPLEMENT	
POLAND	
Electric Power Engineering in Poland and Prospects of Its Development.....	1

## EAST GERMANY

### New Commercial Plastics

[This is a translation of an article by H. Greiner in Feingeraetetechnik, Vol VIII, No 9, September 1959, Berlin, pages 390-392; CSO: 3113-N]

Worthy of note among the well known and basic types of duroplastic materials are the melamine resins--related to the urea-resins--which are being manufactured by the VEB Nitrogen Plant in Piesteritz under the name of "Meladur." This material, which corresponds to Type 152, is processed in the usual tool molds but has a shorter hardening period than phenol resin plastics. Although it does not corrode the molds, chrome plating is recommended, particularly because of the better surface and because the molds are thus more easily removed. The pressed parts have good electrical or dielectrical properties, which reach their optimum upon preheating, preferably through high-frequency. The parts can be manufactured in all colors, but particularly in light colors and in white. This plastic material is used in many branches of industry--for instance, for dashboards in automobiles; for buttons and buckles in clothing manufacture; for office equipment; and, because of their heat resistance, also for household goods; for toys; as structural parts in the building and furniture industries; for musical instruments; in packaging; and also in precision instruments and optics for lens frames, opera glasses, camera bodies, and accessories.

The same melamine resin is also being manufactured with paper layers by the VEB Plastic Works in Spremberg as a laminated plastic "Melacart," in sheets similar to hard paper in thicknesses of 1 to 3 millimeters, in numerous colors, patterns, and microveneers, and in one or multi-color layers--for instance, as engraving material. This material is characterized by its hard scratch-resistant surface, good heat resistance, and particularly light colors. There are two types. Type L is completely tasteless and odorless and completely suitable for medical and other special purposes. In Type V, only the surface is completely tasteless and odorless. The middle layer consists in this case of phenol resin and paper and thus corresponds to the familiar cardboard.



This difference is also reflected in the price. Melacart is approximately six times as expensive as cardboard. It is used for paneling in coach- and shipbuilding, and also as tops for instrument tables and as material for signs. For similar purposes there is a series of new layer materials or compound layer materials in which the various layers often consist of plastics with a very different chemical basis. The Koeppelsdorf VEB Plastics Plant in Sonneberg is manufacturing a large assortment of sign material under the name of "Thermodur." The basic material is hard paper with cover layers of PVC [polyvinylchloride], with or without a softener, in single or multiple layers, and in more than ten colors and patterns. The material is available with either a smooth surface or a dull surface with a web-like finish. Thicknesses are from 2.5 to 5 millimeters, with gradations of 0.5 millimeters. The cover layers are 0.75 millimeters thick. Thermodur is available with a cover layer of either hard or soft PVC. With two or three different colored cover layers of hard PVC, always finished only on one side, this material is called "Thermodur Engraving Material." Its price is approximately twice that of hard paper.

The VEB Plastic Works of Koeppelsdorf also manufacture panels of 5 and 9 millimeter thickness, in which pressed wood fiberboard is the base material; these panels are finished on both sides with hard or soft PVC cover layers. The trade name of this material is "Plastapan F." Panels with hard PVC cover layers are available in 16 colors; those with soft PVC in four color patterns. This material is used primarily for partition walls in ship cabins.

An additional new laminated material is Glakresit Type GK, manufactured in panels by the experimental plant for fiber construction materials in Langenhennersdorf. This material, a mixture of cresol resin and fiberglass, is available in strengths of 3 and 4 millimeters and is also used for facing purposes. The material, which has so far been produced only in experimental quantities, is slightly more expensive than hard paper. With a new manufacturing plant which is under construction, its production will become more efficient, and its price will be lower. But it is perhaps still more interesting that the same type of material is also being manufactured as fiberglass mats saturated with cresol resin, which do not have to be free of alkali and can be molded and hardened under low pressure in aluminum molds, into, for example, bonnets and caps. This makes possible the manufacture of chip-free containers of good durability, since the fiberglass com-

pound makes the finished product very shock-resistant.

The "Hans Beimler" VEB Locomotive Construction and Electrotechnical Works (LEW) in Hennigsdorf near Berlin produces laminated materials with excellent mechanical, electrical or dielectrical, and thermic properties.

One such material is "Phenoglas," a laminated glass tissue material with a phenol resin binding. Panels with a thickness of 0.5 to 100 millimeters and of two types, F and G--with fine or with coarse glass tissue--are being manufactured. Phenoglas has a heat resistance, according to Martens, of 160 degrees centigrade, which is considerably above that of typical phenoplastics. Similar characteristics are found in "Phenobest," produced by the same firm, an asbestos phenol resin laminated material which is manufactured in panels 2 to 10 millimeters thick, and which, while being somewhat stronger than Phenoglas, has a heat resistance of 150 degrees centigrade. Its price per kilogram is about two to three times as high as that of hard paper. Because of their chemical structure, silicon resins have a special position between organic and inorganic materials. They are characterized by a considerably higher heat resistance than that of other plastic materials. Thus the "Glasil" panels, a laminated pressed material of glass tissue with a silicon resin binding manufactured by the LEW have not only very good electrical and chemical properties but also a heat resistance, according to Martens, of 250 degrees centigrade. This corresponds to a continuous heat resistance of 180 degrees centigrade. This high-quality material is used particularly in the building of electrical machinery, where temperatures of more than 150 degrees centigrade have to be dealt with. Higher temperatures occur in other technical sectors, so that this valuable material is certain to find an expanded area of application, particularly in view of its durability in tropical climates. The panels are available in thicknesses from 0.2 to 25 millimeters and, like phenoglas, in two types--i.e., Type G with coarse glass tissue and Type F with fine glass tissue. Upon special order, thicknesses of over 25 millimeters and up to 50 millimeters can also be produced. Its price, as that of all silicon products, is high. A material with equally good thermic properties--i.e., a heat resistance up to 250 degrees centigrade according to Martens, and with almost twice the flexibility--is "Aspasil," a laminated pressed material of asbestos paper and silicon resin, which is produced by the "Hans Beimler" VEB Locomotive Construction and Electrotechnical Works in thicknesses of from 0.5 to 30 millimeters, and

in special order up to 50 millimeters. This material is characterized by its resistance to acids and lyes. Because of its low water absorption and its resistance to mold formation, it can also be used in tropical climates.

Two silicon products of the LEW must also be mentioned in this connection: "Novomikani Si," which uses glimmer paper as a base material and is available in thicknesses of 0.15 to 0.6 millimeters, and upon special order also in thicknesses as small as 0.03 millimeters. It is mostly used as carrier material for commutators or resistors and has the same heat resistance as Glasil and Aspasil.

A material of very similar characteristics is "Novomikaflex," which is used chiefly in electrical technology. It consists of glimmer paper and glass tissue with a binding of silicon resin, and it is flexible, as the name indicates. It is produced as foil in thicknesses of from 0.15 to 0.6 millimeters in a nonhardened condition. This means that between 50 and 200 degrees centigrade the material is thermoplastic. It can be bent in this condition and hardened under temperatures of over 200 degrees centigrade. It then keeps its shape and thus also attains its optimum characteristics. There are two types--one in which the glass tissue is on only one side, and the other which has two layers of glass tissue. The glimmer paper lies between the layers of glass tissue.

With respect to the processing of these materials, it must be said that all the laminated materials mentioned so far can be worked only in a chip-producing manner--i.e., they can be drilled, lathed, milled, sawed, or ground. However, up to certain thicknesses--but seldom over 3 millimeters--they can also be cut while cold or after preheating up to 80 or 100 degrees centigrade.

The chip or dust producing tools should be of speed steel or, better still, of hard metal, for the wear on them is particularly high when used on laminated silicon plastics or on those with mineral base materials.

Among the foam materials which are used for insulating against heat, cold, or sound, or as lightweight building material, Piatherm should be mentioned first. This is a non-elastic, open-cell type of white foam material on a urea-resin base, rot-resistant and durable in low temperatures. It is manufactured by the Nitrogen Works in Piesteritz. It is available in three types--N, H, and U--which differ in their volume weights. Types N and H are available in boards of 20 to

200 millimeters thick and Type U in thicknesses of 30 to 120 millimeters. Type N is also available in half shells as insulation for pipes with diameters in all DIN norms. This material is used chiefly in refrigeration technology, in refrigerator cars and warehouses, refrigerators, and in ship-building. It is used as sound insulating material in housing construction. In the new Berlin State Opera House it was used, for instance, as sound insulation for acoustical purposes.

The VEB Celluloid Works of Eilenburg also manufacture an open-cell but elastic foam material with a PVC base called Poroplast. This foam material, which contains a softener, is manufactured in fine or coarse porous form in different colors or in a neutral color as sheets 6 to 60 millimeters thick. It is used primarily as upholstery material.

Mention must also be made here of a product of Farbenfabriken Bayer, in Leverkusen. This is also an open-cell foam material but is based on polyurethane, a material which is related to polyamide or perlon. It is characterized by a very low volume weight, which can be fixed within very broad limits (0.03 to 0.1), and also by the fact that it can be processed without pressing by means of the so-called jet process into panels and molded parts in simple molds.

The VEB Electrochemical Combine of Bitterfeld is also producing panels with a soft PVC base, 4.8 and 12 millimeters thick in black and brown, with a closed-cell structure and a closed, somewhat wavy exterior, known as Ekazell W. This material is used, for instance, for shoe soles.

Ekazell H. also has a closed-cell structure but no softener. It is a hard foam material with a closed surface and a volume weight of 0.15. It is processed into panels 85 millimeters thick and also into molded parts such as life preservers, buoys for fishing nets, etc.

Styropor is a nearly closed-celled, hard foam material. It can be processed without pressing by means of foaming into molded parts with predetermined volume weights between 0.05 and 0.1. The Electrochemical Combine in Bitterfeld intends to start the production of panels in the near future. The basis of Styropor is water-repellant polystyrol, so that this foam material will be especially useful wherever water condensation is encountered.

Among the thermoplastics that are becoming more and more numerous, the Ekait press and spray material produced by the VEB Electrochemical Combine in Bitterfeld are worthy of first mention. PVC molded parts and profiles with varying degrees of softness are produced from this material. It is used for covering staircase railings, for instance, and recently also for covering the edges of wooden furniture. The VEB Artificial Leather Plant in Zweenfurth has come out with an artificial leather with a PVC patina called "Borwiled," in which the surface has been roughened in sponge-like fashion by means of a chemical process, making it look like suede leather. This material is used for book covers, shoes, for decorative purposes, and for handbags. Among the newer types, we must also mention the polyamide spray-mold material Miramid H and T, developed and in recent years improved by the "Walter Ulbricht" Leuna Works. The mechanical properties, high elasticity, friction durability, and great strength of this material caused an all too great demand for it in almost all industrial sectors, so that controls over the consumption became necessary a year ago. In parts with low tolerances, the swelling characteristics of this material--i.e., the water absorption, which can amount to 10 percent--as well as the evaporation characteristics must be taken into account.

Type T is transparent up to a thickness of 2 millimeters. But polyamide is also processed as a semifinished material. Leuna supplies round sticks of a diameter up to 200 millimeters, from which parts and spray-mold parts can be made by chip-producing methods. The VEB Film Factory in Wolfen and the VEB "Aceta" Synthetics Works in Berlin also manufacture transparent foil, ribbons, and wire in different colors under the name Perfol or Dederon.

Polymethacrylates, which are chemically the same as Plexiglas, are manufactured by the VEB Nitrogen Works in Piesteritz under the name of Piacryl. This thermoplastic high-quality material is available as colorless or transparent blue, green, red, orange, yellow, fluorescent green, or milky white. Because of its good optical properties and its durability in light, this material is also of particular importance for the precision instrument and optics industry. The panes can be shaped by chipping processes but also by chip-free methods through stretching in a vacuum molding process. For chipping processes, mainly for the building of models--for instance, the glass man in the Hygiene Museum in Dresden--Piesteritz supplies a round block with a diameter

of 100 millimeters and a length of 400 millimeters. Tubes are also manufactured by centrifugal mold processes for special orders.

For some time now, Piesteritz has been developing a spray mold material similar to the Plexigum of Roehn & Haas in Darmstadt. It will, however, be some time before this production is ready for the market.

One of the latest plastic materials is Thermoplast MPS, developed by the VEB Buna Chemical Works, a polymerisate mixture of polyvinylacetate and polyvinylchloride. It is characterized by a particularly high stretching property and is particularly suitable for vacuum processing. Complete refrigerator insets can, for example, be molded out of one panel. Parts of such dimensions cannot be molded by means of pressing or spray molding because of the machine dimensions.

Another new plastic material is polyethylene, which is manufactured from the abundantly available ethylene and which is thus very cheap. This material is highly elastic and, with its specific weight of 0.92, is the lightest plastic material. It absorbs almost no water and has very good dielectrical properties. It is easily spray molded but is supposed to have an uneven shrinkage. In West Germany household goods such as milk bottles, pails, bowls, as well as technical parts such as those for high-frequency and medical technology are manufactured from this material. It also has a large field of application as a packaging foil. The world consumption of polyethylene has increased by leaps and bounds within the last year and it will shortly become the most common plastic material besides PVC.

Lastly, a plastic material should be mentioned which has been developed by the VEB Electrochemical Combine in Bitterfeld under the name of Ekafluvin. It is a fluor-carbon; it has a heat resistance of over 200 degrees centigrade; it is extremely immune to acids and lyes; it has optimum electrical properties, absorbs no water, and is physiologically suitable. This material, which is still being produced only in experimental quantities, is very expensive. It is produced either as a powder or in bricks. Ekafluvin is used for such items as leak stops, valve seats and disks, and especially also as a divider, since it has a basic anti-adhesive effect.

## EAST GERMANY

### Present Problems of Standardization in the Machine-Tool Industry

[This is a translation of an article by  
Bruno Kreisel, in Standardisierung, Vol  
V, No 9, September 1959, Berlin, pages  
375-383; CSO: 3118-N/a]

#### 1. Definition of an Industry (Fachbereich)

In the present draft of the Standardization Law, an industry standard is defined as follows:

"Industry standards include a selection of GDR standards required for the industry, as well as additional standards and determinations which are of importance to the industry and are not included in the GDR standards."

This statement does not give any definition of an industry. Notwithstanding the final definition which is being prepared in the Office for Standardization, a definition shall be given here for the WMW [Werkzeugmaschinen und Maschinenwerkzeuge; Machine-Tool Industry]. The machine-tool industry includes first of all the VVB for Machine Tools and the VVB for Tools, Devices, and Woodworking Machines. In addition, it includes enterprises which manufacture similar products and are under the supervision of the Economic Council of the Bezirke. These latter also include private enterprises, co-operatives, and enterprises with state participation.

The machine-tool industry, furthermore, includes similar manufacturing in other industries, such as the self-manufacture of machine-tools in the precision instrument and optical industry.

All industry standards with the symbol WMW are thus legally binding technical data for the industry described and their application is mandatory.

It is difficult to classify marginal cases in an industry. Such a marginal case exists in the case of devices. The standardization of devices, however, falls within the compe-

tence of the Central Institute for Technology and Organization. [ITO]. This institute does not come under the supervision of the Department for Standardization in the Institute for Machine Tools. It is also not advisable to assign it to this institute, since the tasks carried out by the ITO are quite different in nature. The structure of an industry is thus not synonymous with the structure of certain VVB's. Although this complicates the work, it is unavoidable. Still more complicated interrelationships exist in other industries. It is therefore urgent that the areas of supervision be defined as soon as possible.

## 2. Central Manufacture

The success of any standardization depends on the manufacture of standardized parts at a central location. This is a well-known fact, but it has not yet been put into practice. If the economic goals are to be attained, it is not only necessary to assure the central manufacture of the DIN, TGL [not identified], and WMW standard parts; machine elements of a similar kind but with identical technologies must also be centrally manufactured on a regional or territorial basis. The solution of both of these problems is a primary goal of the VVB for Machine-Tools and, since recently, also of the VVB for Tools, Devices, and Woodworking Machines.

The task will be carried out in two stages. First, care must be taken that all standardized parts which are mass-produced by individual enterprises for their own use on the basis of mandatory standard or DIN recommendations are available for purchase, or that, as a transitional solution, they are manufactured at a central location within the VVB. For this purpose, a conference of all standardization engineers of the VVB for Machine Tools took place at the end of February 1959 at the Institute for Machine Tools. Colleagues from the various enterprises brought to this conference exact blueprints and data of the standard parts to be manufactured in their own enterprises. Quantities of over 100,000 washers of DIN 125, over 40,000 hexagonal screws of DIN 931, etc. were added up.

The requisitioning of these parts is being organized in conjunction with the VVB. Three characteristics have emerged:

- 1) A number of enterprises reported to us mass-produced standardized parts which are contained in neither the WMW



selection nor in the screw selection. Even parts which deviated from the existing standards were reported to us. These reports were, in a sense, a self-criticism of the respective standardization engineer. It goes without saying that the respective enterprises were immediately instructed by us to make the corresponding changes in the design.

2) Many of the parts which are still being manufactured by the enterprises in their own plants already correspond to the prescribed selected series. In the meantime, negotiations are being conducted between the VVB for Machine Tools and the VVB for Norm Parts, to the end that the latter should guarantee delivery of the parts at least by 1960. This should be possible, since direct negotiations with screw factories which belong to the VVB have shown that they have excess lathe capacity (Gera Screw Factory) at their disposal.

3) Mass-produced standardized parts were reported to us which were manufactured according to WMW standards but for which the production is not planned within the VVB for Norm Parts. In this case, either certain plant divisions within the VVB for Machine Tools will manufacture these parts or local enterprises will be engaged for their manufacture.

The solution of the above tasks will promote productivity to a considerable extent and will represent an initial success in the reorganization of the enterprises.

A far greater task is the organization of the centralized manufacture of machine elements which are not yet standardized. This concerns the following: main spindles, grinding spindles, thread spindles, bearing and running casings, spur wheels, bevel wheels, multiple-shaft wheels, tail stocks, clutches, anchor nuts, oil pumps, etc.

This central manufacture is being organized by the Department for Technology of the VVB. The production of the parts just mentioned does not depend on their standardization, but the complete success of this centralized manufacture will depend in large measure on gradual or complete standardization. It is therefore necessary that the standardization engineers try, in cooperation with the technology and the design department of the enterprise, to standardize these machine elements as much as possible. For this reason, our Standardization Department in the Institute for Machine Tools of the VVB for Machine Tools submitted the following proposal:

The VVB will issue instructions that working committees consisting of the standardization engineer, a good technologist, and a good design engineer be formed in the enterprises. This composition is to represent the minimum strength of the working committee. Wherever necessary, additional specialists in the specialties mentioned shall be engaged-- in no case, however, nonspecialized personnel, such as junior engineers. These working groups will, regardless of whether or not the manufacture is to be done in their own enterprise, inspect and classify the drawings and technological designs of the above-mentioned machine elements, which have been submitted by all the enterprises of the VVB, according to the following criteria:

1. From the point of view of standardization:

- 1) whether the parts can be completely standardized;
- 2) whether uniform measurements for junctions can be determined;
- 3) whether uniform directions can be established (for instance, uniform hardening processes);
- 4) elimination of the parts which cannot be standardized at all.

The elements which can be partly or completely standardized under 1) to 3) are to be submitted to the Department for Standardization and are included in the standardization plan of the VVB. Details concerning the plan assignee, method of execution, and the subsequent central manufacture will be worked out and determined precisely.

2. The technologist will have the task of classifying the parts according to technological manufacturing principles. Proposals will have to be worked out concerning what processes (for instance, whirling) can be applied to advantage, what enterprise is suited for central manufacture, and whether the central manufacture is to be organized on a regional basis or on the basis of our entire republic. These proposals are submitted to the VVB, and measures are determined through the cooperation between the Department of Technology of the Institute and the Department of Technology of the VVB concerning an immediate central manufacture or the gradual introduction of central manufacture.

3. The design engineer finally submits proposals as to the form in which a gradual adaptation of the elements on a uniform basis is to be carried out. The measurements which are

to be standardized are to be the first step toward a later standardization and have to be coordinated in cooperation between this working group and the respective design departments of the enterprise.

The offices for standardization will contribute decisively to the realization of this proposal. The standardization plans of the enterprises must include especially those plans which are connected with "central manufacturing." Changes in or additions to the plans for 1959 must be made already. Above all, the enterprise plans which are to be worked out within the coming weeks, specifically the plan section dealing with standardization, will have to reflect the tasks mentioned above.

### 3. Cooperation with the Chamber of Technology

The engineer in charge of standardization welcomes any cooperation in his tasks. The larger the group of technical advisers, the better developed is the solution. The knowledge and the abilities of the experts in the Chamber of Technology will have an extremely stimulating influence on the quality of the standards.

Thus, the will to cooperate is there, but all too often the partner for it is missing. In many enterprises there is a local chapter of the Chamber of Technology, but there is no comprehensive working program which could even in only an approximate fashion do justice to the great requirements of standardization.

A directive published by the State Planning Commission (published in special issue No 3 of Standardisierung) makes it the duty of the directors of the people-owned enterprises to support the plant chapter of the Chamber of Technology by making material and data available to them for working out plant standards. No case is known so far in which this has taken place. One should not wait until the VVB checks on the realization of this directive; the office for standardization must themselves take the initiative and establish contact with the plant directorate and the plant chapter. The Institute for Machine Tools, as a technical-scientific center, will take measures through agreements with the Technical Association for Machine-Building of the bezirk directorate of the Chamber of Technology, which will also have a stimulating effect on the work within the plants.

The aim is, in any case, to make full use of the valuable work of the Chamber of Technology.

#### 4. Higher Academic Institutions and Technical Schools

A close relationship with the Higher Academic Institute for Standardization of the Higher Academic Institution for Mechanical Engineering and with the engineering schools in this technical field is mutually advantageous. Under no circumstances do we want to do without them. Thus, extensive contracts have been given out to them which will help in the solution of plan tasks of which enlist the participation of the students in the solution of basic problems. In a few instances, but to an increasing extent, topics on standardization problems are given out for degree theses.

A conversation with the lecturer on standardization at the Technical School for Machine Tools indicated, however, that the curricula will have to be improved. The few available lecture hours should not be wasted any longer on such dry discussions as: What is DIN? What is TGL? What does a GDR standard form look like? What are nomenclatures? How is a standard sheet developed? What is mandatory? etc. This is one method of warning the student not to become a specialist in standardization. We are of the opinion that the students must be made to realize that standardization work is interesting engineering work. Once he has developed an interest in this work, he will also learn the technique of standardization.

#### 5. Binding Nature of Standards

Industry standards, before being sent to press, are checked by an examining commission for three criteria:

- 1) economic effectiveness (centralized production must be assured;
- 2) technical exactness;
- 3) standardization-technical correctness.

A very strict standard is applied in each case. This applies also to the DIN forms, which can rarely be taken over in their entirety.

One copy is made of each industry standard released, signed by the director of the Standardization Department, and submitted to the chief director of the VVB for his countersignature. This copy is kept under safeguard and may not be changed in any way. The printed WMW standards carry on the right side below the heading the prescribed entry making it binding, and they are also introduced by the plants. A countersignature of the originals is not possible, since uncontrolled changes could thus be made. It is to be applauded that the VVB for Machine Tools enforces the observance of the standards with all the authority at its command. On the other hand, the Department for Standardization has been given extensive authority to participate in organizing the introduction of the standards.

The activity of the above-mentioned examining commission includes clarification of a number of continuously recurring questions with respect to standardization techniques. This fact has caused us to generalize the experiences. Memoranda are being issued in irregular sequence, which, in the form of a question and answer game, indicate a solution which from then on will be considered as a resolution, is to be applied to industry standards as binding, and is recommended to the enterprises for the application of plant standards. The memoranda are included in the trade journal Fachbereich-Standardisierung.

## 6. Supervision of Enterprises

Within the coming weeks we shall resume visits to the enterprises. These visits will be partly in the nature of a strict examination. The office for standardization will assist us in this activity and make its reporting staff specialist available to us. We intend to consult all the departments of the enterprises. The success of the inspection will have to be assured by us through good preparation. It is recommended in any case that the enterprises also make all the necessary preparations for these joint conferences. In these visits to the enterprises we shall place special emphasis on the discussion of the plan for 1960 and the long-range plan.

## 7. Order of Business

The order of business for the standardization of our industry is a directive of the chief directors of the VVB's to the enterprises concerning the organizational procedure of the standardization work. The VVB for Machine Tools has provided in its plan of action that the order of business be the subject of a conference of the plant directors collective.

## 8. Documentation

Our industry will be one of the first to be familiarized with the entire documentation of foreign standards in its technical field. For several weeks we have been classifying many foreign standards, including such standards as those from the USA, England, the USSR, the CSR, Hungary, Poland, etc.

We hope to have advanced shortly to the point of being able to meet the entire requirements of the industry for the availability of these standards. This means that interested parties will apply in the future to our Standardization Department if they wish to have access to this documentation. It will, however, take a longer time before we will be able to give a catalogue of all the standards in our possession. For the time being, therefore, any orders will have to be made from the national indexes, which are available for inspection at the central rental places. We also have to point out that not all standards are available in translation. We request that note be taken of our current announcements in this connection in Fachbereich-Standardisierung.

## Reorganization of Enterprises and Central Manufacture

### 1. Goal of Reorganization

Reorganization will have to be carried out in two ways:

- 1) through the equipment of enterprises with complete new installations and means of production, and
- 2) through the utilization of old installations in which production is to be improved through mechanization; plant

organization must correspond to the high technical requirements. The transport system must be subjected to a thorough study and be adjusted in the best possible manner to the technological conditions. Over-all production is to be specialized.

This second way will have to be taken almost exclusively within our industry sector. In the process of standardization, we will therefore have to be primarily concerned with the improvement of the above-mentioned factors. In this respect, one of the questions which will also have to be studied is whether sectional standards are to be worked out for groups of plants--i.e., whether plant standards are to be applied in several enterprises with the same specialized production.

The international division of labor, the proper proportions within our economy, and the specialization within the industry sector must under all circumstances also be taken into consideration in the plans for the individual enterprises, since our finished product, the machine tool with its tools, has a determining influence on the production of all sectors of industry.

Standardization will also have to take account of the following considerations in the realization of this second approach to structural reorganization: a shift of production operations to suitable machinery; copy lathe work, if lots are sufficiently large; the use of methods for shaping the parts which do not create clippings or chips if this is the better technological method; the use of contrivances and devices where possible; wherever it is more economical, items should be individually manufactured rather than on automats and rotators.

A reorganization in which the existing means of production are retained requires, furthermore, that frequently recurring parts which are not yet standardized also be produced in a specialized manner and that groups of parts be standardized at least in their juncture dimensions and be likewise produced in a specialized fashion. In this connection, it should be asked whether enterprises belonging to the local industry can be engaged as direct suppliers, and whether an enterprise or a plant division can or should carry out the production for the entire VVB. Under certain conditions, regional manufacture is to be taken into consideration.

The beginning of specialized production must be concurrent with the beginning of standardization work. Nothing must prevent us from utilizing all possibilities for a rationalization of production.

## 2. Tasks of the Standardization Department in the Institute for Machine Tools:

- 2.01 Coordination with the socialist countries
- 2.02 The procurement of standardized mass parts, as long as these parts are not made available by the Office for Standardization (Amt fuer Standardisierung) or the State Planning Commission
- 2.03 Complete revision of the work on WMW standards
- 2.04 Support for the "Central Manufacture" Operation of standardized individual parts and groups of parts
- 2.05 Type designations for complete device installations
- 2.06 Tool catalogue
- 2.07 Units
- 2.08 Formation of socialist collectives
- 2.09 Cooperation with the Chamber of Technology
- 2.10 Development of control figures (Kennziffern)
- 2.11 Additional assistance to the enterprises
- 2.12 Operation "Type Classification of the Most Important Products of the Machine-Building Industry"
- 2.13 Conditions of acceptance

### 2.01 Coordination with the Socialist Countries

The next task is to continue, after a successful beginning, the work of coordinating the type standards in the socialist camp. The result achieved so far is the agreement on the main parameter. If specialization is to be carried out within the socialist economic bloc--i.e., certain types and sizes of machine tools will no longer be produced in our republic--it is necessary to achieve a mutual adjustment of all main measurements and performance data which are usually contained in a type sheet. At the point at which production is discontinued in our country, we must be able to obtain the same product with the same design from countries friendly to us.

The Institute Department for Transforming Machines has attained a considerable lead in this international coordination over other departments. This coordination is already the subject of discussion in this department.



We are of the opinion that, after the scientists have come to an agreement about the specialization program, the standardization experts of the socialist countries should by all means get together in order to determine uniform main measurements, starting with the type standards, which should then be reflected in the common standards.

In this connection, the work of the specialist of the tool sector can serve as an example. Aside from an excellent cooperation between the Department for Tools and the Department for Standardization, the technical experts who attended the international congresses were extremely well informed about the state of standardization in their respective countries. The intensity with which the national standards are being analyzed at the international congresses of this sector, and with which a common ground is being sought can serve as an example; this will then be the common ground of the socialist countries in negotiations with the ISO [not identified]. It is recommended that particularly the respective standardization engineers of the tool sector take a look at the plans in the Institute for Machine Tools.

The fact that the Technical Department for Tools of the Institute and the design offices of the plants have a large share in the standardization work is to be welcomed. This shows that standardization is not to be merely the work of a department named for it. This applies especially to the plants in Koenigsee, Schmoelln, and Altenburg.

A number of tasks of obvious international importance should also be worked out as uniform standards within the framework of the socialist countries. For this purpose, the central standardization authorities, as in our country the Office for Standardization, should organize a get-together of the technical experts with a corresponding agenda.

## 2.02 Procurement Questions

As is known, the greatest concern of standardization is the manufacture of standardized products at a central point. For us in the standardization field, this central manufacture is the chief link in the chain of our present work.

The VVB and the staff members of the Department for Standardization of the Institute for Machine Tools continually endeavor to contract for the production of standardized parts

in specialized enterprises. The example of the examining commission was mentioned earlier to show the extent of our efforts in this direction. Only standard whose production is one hundred percent assured are being released, even if these are only the usual DIN sheets. The proposed design is not only sent back but the people who work on it are at the same time instructed to either organized the production up to a certain date themselves or to contract for it with the help of the VVB or other governmental offices.

This solution and other improvised measures cannot be the last word of wisdom. What must therefore be done?

A so-called production department will be established at a central location, preferably in the Office for Standardization. This production department will receive a certain amount of circulating funds and will be assigned to and have the right to organize the central production of standardized products which are required in more than one industrial sector. The available circulating funds are to be used for the procurement of tools and similar items, while the expenditures are to be covered by amortization. An actual example is given to illustrate this proposal: the enterprises of the machine-tool industry have for many years been producing their pipe clamps by hand. In the "Henry Pels" VEB for the Construction of Presses and Shearing Machines, these amount to 39,000 per year; in the entire VVB they amount to over 300,000. All efforts to procure these parts through the DHZ [presumably, Deutsche Handelszentrale; German Trade Centers] have failed. By means of an engineer account (Kontos)--i.e., through internal initiative--the central manufacture of these items was organized for our industry and several DIN sheets were combined in the WMW Standard 07 604. The colleagues who participate in the engineer account have concerned themselves with the procurement of the material (waste sheet metal from a plant in Karl Marx Stadt); they have procured tools, and they have found an enterprise--a production cooperative--to do the manufacture. The engineer account amounts to an annual number of 300,000 pieces. By April the production cooperative reported orders for 400,000 pieces. This has brought a welcome economic advantage to our industry, but the capacity of this enterprise is not adequate to supply our entire industry with pipe clamps. Who in this case is to organize the central manufacture for the entire economy? In our opinion, only a production department at a central location, as I have proposed. It goes without saying that this production department

should work with the authority of the State Planning Commission.

We know that our proposal is encountering considerable objections. But we cannot wait until these difficulties are finally resolved through long discussions. For this reason, the departments for standardization in the technical-scientific centers should be granted authority for the following:

Certain sums from the available funds for the standardization of the industry should be allocated for the procurement of tools. If our department, for instance, had had the authority to spend 3,000 DM for a spraying tool for door hinges, the central manufacture of these hinges would already be assured, and--equally important from an economic point of view--the 3,000 DM would have already been amortized. The Department for Standardization will likewise continue its efforts in this direction.

A completely new problem has recently arisen. In some cases the production of standardized mass parts is already assured with respect to productive capacity. Thus the VEB for Cut and Form Building, in Berlin-Koepenick, for instance, is ready to produce individual parts for punch press tools which are urgently needed in our industry. The respective DHZ in Leipzig, however, does not have the necessary storage space to receive the finished products from the plant.

## 2.03 Complete Revision of the Work on WMW Standards

When the Office for Standardization, in a major move, subjected all the DIN sheets which had been declared as binding up to a certain date to revision, as well as the State Standards which had been brought out up to that time, we in our industry did not do the same with our industry standards. Today the contradictions which occur daily have convinced us that a comprehensive and general revision has become necessary. Naturally, all the standards contained in our WMW portfolios (no matter whether they are DIN, TGL, or WMW), with the exception of the few recommendations, remain binding until they are replaced by new releases.

The deficiencies of the WMW industry standards are founded in the following:

1. The selection of the WMW standards has to be made on the basis of far stricter criteria, and in many cases there must be far less compromise.

2. There are a number of DIN sheets which experienced colleagues are still saying can be taken over without any change. The examining commission has recently sent back for revision a number of supposedly perfectly clear DIN sheets which showed considerable deficiencies! The truth of these statements is to be shown to the standardization engineers by means of a small example: the plans for a drilling device were printed under the serial number 22 220 (DIN 6347). The engineers of the device-building industry have succeeded, by means of a thorough structural analysis, in developing a technically more perfect device which is easier to operate and which can be built with less material, and they have kept this design as a standard for a series which had been produced.

The revision requires an extensive program, and it will be necessary that the plants participate in large measure in this activity.

## 2.05 Type Designations for Complete Device Assemblies

Such parts of devices as eccentric tighteners, drill sockets, high nuts, etc. are standardized mass parts, or are to be determined as such and belong to the production program of the VVB for Norm Parts.

This position is clearly taken by the institute, by the VVB for Tools, Devices, and Woodworking Machines, and by the production enterprises for devices.

Although some device-building plants are still manufacturing these parts themselves, we must reach the point as soon as possible where our device-building plants can be supplied with these parts on a purchase basis. It is the task of the device-building enterprises to set up a series of standardized devices, or, as is now being done in the design office at Hohenstein, to standardize small independent groups of devices, to fix these according to size, and to produce the various groups of their structural parts and the complete device assemblies on an economical basis.

On the initiative of the VVB in Gera, a catalogue of devices will be printed shortly. This catalogue will contain all devices available for delivery. But not in every case has the standardization of the product been carried out. Two tasks must be accomplished.

1. Devices must be delivered, even if they are not yet part of a standard series.

2. The standardization of the devices must be completed as soon as possible in order to replace the nonstandardized parts in a new edition of the catalogue.

For the working method just described with respect to devices, we have already available to us the experiences from a related field. Over two years ago a collective in the Ministry of General Machine Construction studied the production possibilities of cutting and stamping trestles and included all the products available for delivery in a catalogue, irrespective of logical standard series. In the meantime, the Subcommittee for Stamping Tools of the Norm Commission of the GDR (Normungskreis DDR) has worked out standard proposals and submitted them for approval in the form of a brochure. It must be mentioned that the DNA [German Norm Commission] has endeavored for almost twenty years now to standardize the cutting and stamping trestles and to effect production along these lines. Approximately 400 plants and offices were asked for their opinion of the results of the work of our subcommittee. Today we can report that all objections and proposals have been taken into consideration and that production is assured as of 1960. What the DNA could not achieve in twenty years has been accomplished during one year of painstaking labor, partly in voluntary group work. A new edition of the DHZ catalogue will include all designs which by that time have been approved as GDR standards.

## 2.06 Tool Catalogue

One of the blue series of brochures of the Institute for Machine Tools published by our department, brochure No 7, entitled "Type Designation of Milling Machines," is well known. This brochure represents the modest beginning of a type catalogue for machine tools and was published in order to obtain the necessary criticism for the development of such catalogues. It is intended to give a catalogue containing binding data about the type designation program in our

industry to the various departments of technical and scientific centers, to such central administrative organs as the Planning Commission and the Office for Standardization, and to the foreign trade organizations.

A similar but far more extensive catalogue is planned in the sector for tools and clamping tools. Only standardized parts are to be included, and it is to be stated in the catalogue that tools or clamping tools which are not included in the production program will have to be subject to special approval, that they will have longer delivery periods, and that they will cost more than standardized products.

Besides GDR standards and industry standards, only re-approved DIN sheets can be included in the catalogue. In the catalogue we intend to go further than is possible in a standard. We want to designate preferential series in order to aim toward a greater selection. We want to promote modern clamping devices over clamping devices which will become obsolete in the further development of our industry.

## 2.07 Units

Special Issue No 1 of the Institute information bulletin is based on this work. The units contained in this issue must be worked over in a constructive step-by-step manner, while the design work must go hand in hand with standardization.

The work in the field of units is so extensive and so precisely outlined in Special Issue No 1 that no further discussion is necessary in this connection.

## 2.08 Formation of Socialist Collectives

If we wish to accomplish the extensive and complicated program of transformation and technical advance in our economy, it will be necessary to put particular emphasis on socialist cooperative work. Comrade Walter Ulbricht pointed this out with particular emphasis on the occasion of his visit to the Institute for Machine Tools.

## 2.09 Cooperation with the Chamber of Technology

We are currently preparing an agreement with the association for machine building of the Bezirk executive committees of the Chamber of Technology. This agreement will state the following:

1. The association will promote the standardization idea in all working committees.
2. Measures shall be taken to make the work in the Chamber of Technology more interesting, so that the engineer or scientist faced with a multitude of social obligations will not be inclined to cut out his attendance at the discussions in the Chamber of Technology.
3. The Chamber of Technology will exercise an active influence on the socialist cooperative groups (collectives) being established.
4. The primary official work will be related to the voluntary cooperative work, etc.

These points obviously do not indicate everything optimally necessary in order to make effective use of the Chamber of Technology for the purposes of standardization. Our ideas are still incomplete in this respect.

## 2.10 Development of Control Figures

The concept of control figures will be a new one for most standardization engineers. They will soon realize, however, that their planning work and the proof of their success will no longer be possible without a thorough determination of control figures. In Unity, Hermann Grosse says on page 475:

"It is therefore important that the reorganization programs of the enterprises and the industries combine and express in a detailed system of technical and economic control figures all the measures for the specialization of the enterprises; for the standardization and type classification of the products; for changes in techniques, in technology, in the organization of work; and in the cooperation by means of which the goals of the long-range plan are to be attained."

What is the meaning of control figures with respect to standardization?

1. The proportion, expressed as a percentage, of standardized parts in the finished total product.
2. The value proportion of these parts.
3. The value proportion of the purchased parts.
4. The value proportion of the repeat parts, etc.

The following example shows that some experts, without knowing the concept of control figures, are in actual practice already using it.

A design office for devices determines the size of the bonus on the following basis: the highest bonus is given to the design engineer who succeeds in utilizing the greatest number of available individual parts, regardless of whether these are standardized mass parts or repeat parts. You would be amazed at the degree of rationalization in the design work in this enterprise.

The determination of control figures requires, of course, thorough scientific study. Thus, to give an example, it will be necessary to study a lathe or milling machine and to determine the degree of standardization. If it is 30 percent, this means that the particular design contains an equivalent percentage of standard parts, such as roller bearings, screws, operating parts, etc.

With a 10-percent increase in the degree of standardization, the standard man-hours required for manufacture are decreased, fewer workers are used, and the required production area per machine is reduced. The individual components do not, of course, increase or decrease in the same proportion. They vary, depending on the proportion of labor costs and costs of materials in the machine parts, and on other conditions.

The change in the degree of standardization is to be the basis of plant design in the future. The plant will then be in a position to predetermine the relative change in productivity caused by a change in the proportion of standardized elements, and the Office for Standardization will already be in a position to prove the economic utility of its work while working out the plan. Then there will be no economic official



who will not support the standardization work to the degree necessary.

### 3. Tasks of the Offices for Standardization

3.1 Introduction of Standards. The most important task of the Offices for Standardization will be the introduction of all binding industry standards into production. This also applies to machines of current series. The term industry standard includes all standards published in our WMW volumes, regardless of whether these are TGL, DIN, or WMW standards.

3.2 Strict Supervision of Supplied Parts. The second and equally important task is the strict supervision of supplied parts. We demand the strictest control on the part of the offices for standardization. Products which do not conform to standards are to be rejected in all instances. The offices for standardization will have to prevail in this connection over the purchasing and the material supplies departments.

3.3 Avoidance of an Uncritical Acceptance of Industry Standards. Industry standards have been developed for a large branch industry. It is therefore impossible that the complete catalogue of standards can be accepted in each plant. But in checking on plant standards we find time and again that the entire line of standards is being accepted.

3.4 Within the limitations of this article, it is not possible to enumerate the tasks for each individual plant. The following remarks are therefore kept in general terms. The work in the offices for standardization is based primarily on the following three aspects [elaborated further below]:

- 1) Organizational-administrative
- 2) The standardization work leading to plant standards
- 3) The design-technological standardization as a cooperative undertaking on a plant basis

1) This aspect includes the introduction of changes, the registration of standards, the evaluation of the information pamphlet, Fachbereich Standardisierung and of the technical

journals Standardisierung and DIN Mitteilungen, etc. It is regrettable that in some offices for standardization there are still some staff members who see their task in this aspect alone and are completely occupied with this work.

2) This aspect includes the development of plant standards such as selected series, doors, hinges, sockets, springs, etc. In the entire industry there are this year only about one hundred items provided for in the plan. No further discussion is needed to prove that this number is much too low and that decisive measures will have to be taken to change this state of affairs.

3) Under the heading, "Control Figures," I remarked on the cooperative work involved in standardization. Just as in a modern design office it is today unthinkable to work without design technologists, it must henceforth be also unthinkable to get along without advice and supervision concerning matters of standardization. The majority of standards must be developed hand in hand with the design work. A number of enterprises have already achieved some success in these fields. The VEB Hard Metal Works in Immelborn, for instance, is working according to the following motto:

"To produce on the basis of standardized products means to orient oneself to the highest state of technology."

The entire production of hard metal plates and lathe chisels is based on the latest state of standardization. But unfortunately, there are still enterprises which manufacture thread drills according to completely antiquated and long invalidated thread norms of the DNA. Within the offices for standardization, the opinion is still prevalent that standardization tasks are to be solved only by them. We are of the contrary opinion that standardization tasks are to be carried out primarily by the design office, the technologists, and the organizers of the plant.

3.5 In connection with the demands made on the offices for standardization, I wish to point out a particularly important factor. The majority of designers ignore in their designs the selected series for tools. On checking this with the shop drawings, it is evident, even with radii

which have to be milled, how little thought has been given to the standard of tools. This observation applies to all tools.

3.6 The offices for standardization have furthermore the task of giving effective support to the cooperation with the plant chapter of the Chamber of Technology. Thus, in the further elaboration of control figures to be worked out by the institute, one task of the plant chapter could be to develop some ideas as to how these can be determined within their particular area in order to increase the effectiveness of standardization.

3.7 The offices for standardization and the quality control of the plant must also cooperate closely in order to ensure the quality of standardized products.

3.8 For the moment, the plan for the plant must be worked out. By means of an example, I wish to describe here what such a plant plan might look like. This example is based on an excerpt from the reorganization plan of the office for standardization of the VEB for the Construction of Presses and Shearing Machines in Erfurt.

According to this plan, this enterprise will save 101,160 net working hours in its plant through standardization projects in 1965. Here are some details of these plans:

In the production of pressure spindles, 14,600 man-hours will be saved in 1960.

The costs of developing the standard and of the design changes amount to 8,000 DM.

The saving will be effected through the following:

A reduction from 28 to 12 sizes;

Production will be switched from a standard lathe to a hydrocopy lathe;

Already a series of five units is resulting in savings;

Ball lathe work has so far been classified in wage category VI. The introduction of copy-lathe work will put it in category IV.

The resulting savings in production time amounts to 14 percent.

In the case of a draw installation, a saving of 12,400 man-hours will be attained!

So far there have been 27 different models. The estimated costs of readjustment amount to 12,000 DM. In this particular project, such small parts as press cylinder, pressure pistons, collar bushings, valves, etc. are to be hydrocopied.

It is evident that thorough studies are necessary in order to set up a meaningful and rational plan. But only under this condition can the plans for 1960 be realized. We ask that these studies are carried out in the coming weeks and that the plans are prepared accordingly.

The standardization part of the reorganization plan of the VEB for the Construction of Presses and Shearing Machines is, of course, set up for several years. If we base the 101,160 man-hours saved in one year on the average hourly wage of 1.66 DM in wage category V, and if we add to this the operating costs to the extent of 80 percent, the standardization in this plant will result in a direct saving of 302,266.08 DM.

#### 4. Conclusion

We are faced with the task of bringing the reorganization to a successful conclusion. Standardization will of necessity play a key role in this task. The basic principles have been stated earlier.

This article has expressed the point of view of the Department for Standardization of the Institute for Machine Tools. We would be grateful to our readers if they would communicate their point of view and their own proposals and experiences, because a stimulating exchange of ideas can improve our plans or help with our further experiences.

## EAST GERMANY

### First Standardization Agreement Between the Chamber of Technology and the State Planning Commission

[This is a translation of an article by Gertraud Taeubrich in *Standardisierung*, Vol 5, No 9, September 1959, Berlin, pages 400-420; CSO: 3118-N/c]

In all recent publications, be they resolutions of our government, main reports of the Fifth Plenary Session of the Central Committee of the Socialist Unity Party of Germany, or discussions concerning socialist reorganization in our economy, standardization is one of the key topics of discussion. Its importance for the solution of the chief economic task in our republic was clearly indicated at the standardization conference of the State Planning Commission in February 1959. The statement that standardization is not keeping pace with the speed of technical development was a cautious understatement. The fact is that it has never yet kept pace with the development of our economy.

What is the situation in such individual sectors of light industry, as, for instance, the furniture industry? The socialist reorganization and the objectives of the Seven-Year Plan provide for an increase in the value of furniture produced in the German Democratic Republic from 1.1 billion DM in 1958 to 1.87 billion DM in 1965--i.e., an increase of 171 percent. As the planners in Zeulenroda-Triebes have recognized, such an increase is not possible with the artisan shop principles of the capitalist past; modern mass production must replace artisan shop manufacture. One of the prerequisites for a rapid realization of the stated objectives is standardization. The previous state of development in the entire woodworking industry is unsatisfactory, and great efforts will have to be made by the technical-scientific center, the Institute for Wood Technology and Fiber Materials, and by the employees of the enterprises, in order to make up this time loss. The institute has developed new processes, but no uniform technology for the introduction of these processes into production, laid down in the form of industry standards, has been developed concurrently.

The goal is mass production, but standards for individual parts and fixed reliable tolerances are almost nonexistent. And yet these are the basic factors for cooperative effort in the furniture industry. This deficiency has been recognized and is being taken into consideration at present in the determination of the plan for 1960 and of the long-range plan.

In the textile industry, no systematic development of standards existed before 1959. There are approximately 450 industry standards, known under the abbreviation "TexN," but the observance of the values stipulated in them leaves something to be desired. The numerous exemption permits which have been granted by the Research Institute for Textile Technology led--at a conference between representatives of the German Office for the Inspection of Materials and Goods, the Research Institute, and the Office for Standardization--to a decision to start a systematic revision after the Law on the Execution of Standardization Work, which is in its tenth draft at present, goes into force. Paragraph 10 provides for a fine of 500 DM in the case of a nonobservance of standards.

The following tasks of the textile industry contained in the plan for 1959 represent for the first time the basis for a systematic development of standards:

1. Yarns

a) classification

b) fineness selection series and twists

2. Weaves and knits (Kettengewirke)

a) classification, concepts, symbols

b) widths

Although the objectives were not understood by everyone at first, a joint discussion of the intermediate results showed that even the skeptics are now convinced of their validity.

In the clothing industry, the emphasis is on the development of minimum quality requirements for external clothing as well as on the determination of sizes and measurements according to scientific criteria and on the basis of mass measurements carried out by research projects.

In the container industry, the beginnings have been made in standardization on an international level with respect to the following:

The determination of a uniform measure for the "palette" of 1,000 x 1,200 millimeters.

The joint solution of a uniform system of measures (volume system) together with the CSR, Poland, and Hungary.

The proposal of the GDR to coordinate the inspection requirements for paper and cardboard between the people's democracies.

In the textile industry, a beginning has been made toward determining uniform inspection requirements on an international level by way of the technical-scientific cooperation agreement.

An additional task is the introduction and observance of the developed standards. The methodological principles of the plan for 1960 contain for the first time a section which provides for the introduction of standards into production within definite time limits. But the solution of all the tasks mentioned is possible only with the cooperation of each individual. For this reason, an important task is given to the Chamber of Technology as a result of the standardization conference of the Second Convention of the Chamber of Technology and the Fifth Plenary Session of the Central Committee of the SED [Socialist Unity Party].

"To organize the exchange of knowledge with respect to problems of standardization and norms in the GDR with an evaluation of the results achieved in other countries in this field." This was the resolution formulated in the discussion at the Second Convention of the Chamber of Technology.

The following excerpts summarize the binding contents of the decree of Bruno Leuschner, Chairman of the State Planning Commission, of 21 February 1959, published in Special Issue No 3 of Standardisierung and in issue No 5 of Verfuegungen und Mitteilungen der SPK [Decrees and Information of the State Planning Commission]:

"The heads of the divisions of the State Planning Commission must reach an agreement with the executive committees of the respective industrial association of the Chamber of Technology and in cooperation with the Office for Standardiza-

tion with respect to the inclusion of the industrial association in the development of the GDR and industry standards.

"The directors of the VVB's and the technical and scientific centers attached to the VVB's will make agreements with the respective organs of the Chamber of Technology concerning the cooperation of these organs of the Chamber of Technology in the development of proposals for standards.

"The directors of the people-owned enterprises are obligated to support the plant chapters of the Chamber of Technology by making available to them data on the development of plant standards."

What has been done so far, and what proposals have been made for further work?

In putting the resolutions of the Second Convention of the Chamber of Technology into practice, an agreement was made between the presidium of the Chamber of Technology and the Office for Standardization, which was published in No 5, 1959 of Technische Gemeinschaft and was included in issue No 7, 1959 of Standardisierung. This agreement stated that within the framework of voluntary technical cooperation, the Chamber of Technology with its 73,000 members and more than 4,000 plant chapters and inter-industry working committees is the organization best suited to include not only all members but also large groups of scientists, engineers, economists, and technicians in the standardization work required by the socialist reorganization and also to advise and support the scientific-technical institutions and the state organs in industry and agriculture regarding the solutions of their tasks in the field of standardization as well.

On the basis of this agreement and in putting into effect Section 5 of the Decree of the Chairman of the State Planning Commission, an agreement with respect to standardization problems was concluded--the first in our republic--between the industrial association of light industry (textiles, clothing, leather) of the Chamber of Technology and the Division of Textiles, Clothing, and Leather of the State Planning Commission.

This agreement was signed by Professor Dr W. Bobeth, as Chairman of the industrial association of light industry, and by Kirsche, the Director of the Division of Textiles, Clothing, and Leather of the State Planning Commission.



The following tasks are given to the industrial association of light industry of the Chamber of Technology:

a) The popularization and explanation of standardization in its political, economic, and technical aspects. In this respect, emphasis is placed on treating the problems of reorganization, such as technology, specialization, cooperation, etc., in connection with standardization.

b) The exchange of knowledge on an inter-industry basis, with special emphasis on the exchange of knowledge between manufacturer and consumer.

c) The inclusion of standardization problems at conventions, lectures, etc., particularly problems on the creation of types and on a rational reduction of the assortment. In particular instances, conventions can also be organized for this purpose.

d) Cooperation in the planning and development of standards through counseling, the development of proposals, and a critique of preliminary designs of standards.

e) Collaboration in the revision of industry and GDR standards according to the latest state of technology.

f) Collaboration in controlling the observance of standards and their practical results.

g) Collaboration in the evaluation of the results of standardization in friendly and in capitalist countries, including the designs and recommendations of the ISO [not identified]. In order to avoid duplicating work, it will in each instance be necessary to check with the Department for Standardization of the technical center of the VVB's.

h) Collaboration in determining the position of the GDR with respect to discussion in the DNA [presumably, German Norm Commission] or in the ISO, and in submitting proposals with respect to delegation problems.

The State Planning Commission commits itself in this agreement to the following:

a) To invite the official of the industrial association responsible for standardization questions to standardization

discussions within the Division of Textiles, Clothing, and Leather of the State Planning Commission.

b) To instruct the VVB's to include the organs of the industrial association in the discussions concerning the planning of standardization tasks, the design of individual standards, and the control over the observance of standards, in order to achieve real cooperation in standardization work.

c) The revision and elimination of a deficient treatment of standardization within the state apparatus as well as in the enterprises in each instance in which this is made evident through criticisms by the organs of the industrial association.

d) To discuss the cooperation with the organs of the industrial association of light industry and with the plant chapters at the meetings with the directors of the VVB's.

d) To give technical and organizational assistance in organizing training courses and an exchange of knowledge within the particular technical field with respect to standardization.

This agreement will be published within the next few days and sent to the heads of the technical committees and working committees of the Chamber of Technology as well as to the respective standardization departments of the technical-scientific centers (abbreviated ZfS), to the offices for standardization (abbreviated BfS), and to the responsible organs of the government and of the economy. It will be accompanied by a memorandum on the organizational aspects and by a schedule showing the coordination between the departments for standardization of the technical-scientific centers (ZfS) or the offices for standardization (BfS) on the one hand and the technical committees or the working committees of the Chamber of Technology on the other hand.

Additional agreements between the directors of the Associations of People-Owned Enterprises (VVB's) and their respective technical-scientific centers, on the one hand, and the respective organs of the Chamber of Technology on the other hand, in accordance with Point 6 of the Decree of 21 February 1959, will not be worked out for the time being. The Chamber of Technology has postponed the solution of this task until the organization conference.

In conclusion, we will discuss briefly the organizational procedure, since this question could arise in working out the tasks of the agreement.

The planning provides for the following: the Departments for Standardization of the Technical and Scientific Centers and the Offices for Standardization will transmit the coordinated proposals of the plants to the plan proposal to the predetermined working committees of the Chamber of Technology for their opinion and additions. The Departments for Standardization of the Centers and the Offices for Standardization will give the working committees of the Chamber of Technology sufficient time for a conscientious study of these proposals within the set time limit so that they can be passed on for additional revision by higher authorities.

With respect to collaboration in the development of the standards, it was stated that the preliminary standard designs will be submitted by the respective Standardization Departments of the Centers or the Offices for Standardization to the predetermined working committees of the Chamber of Technology for their opinion, concurrently with their submission for publication and for approval. The opinion will have to be given in writing to the responsible Departments for Standardization of the Centers or the Offices for Standardization within the period stated in the proposal. The plan determined by the responsible state organs for the introduction and observance of standards will be brought to the attention of the plant chapters of the Chamber of Technology by the state organs through the plant directors. The plant chapters will support the realization in the production of the measures determined and will watch over their observance. Difficulties and violations occurring are to be reported by the plant chapters to the plant management and, if necessary, to the responsible Standardization Department of the Centers and Offices of Standardization.

Cooperation on a national and international level is also briefly discussed in this memorandum.

The tasks set by the Second Convention of the Chamber of Technology, the road of cooperation shown in the agreements, and the solution of the tasks given us by the Fifth Party Convention and by the Fifth Plenary Session within the sphere of socialist reorganization have as their prerequisite the enthusiasm of our scientists, engineers, technicians, and workers. If we all carry our good intentions

and the necessary enthusiasm to the outside, and if we follow the appeal of Bruno Leuschner to stop underestimating the importance of standardization and bring spirited momentum into the entire standardization work in our German Democratic Republic, we will also help to fulfill the pledges to celebrate the tenth anniversary of our Republic without any plan deficits in the field of standardization as well.

"The members of the Chamber of Technology also contribute to the achievement of the plan for standardization." This should be the motto for our further work.

## EAST GERMANY

### Highway Construction in the East German Seven-Year Plan

[This is a translation of an article by R. Schild, Certified Engineer, Chief Engineer, HV of Highways, in Der Deutsche Strassenverkehr, Vol VII, No 9, September 1959, Berlin, pages 311, 314-315; CSO: 3400-N]

Highway authorities will have an especially important task in the coming years--that of answering fully the requirements of the continuously increasing motor-vehicle traffic in the period of the Seven-Year Plan, and speedily solving the problem presented by the striking discrepancy now existing between the insufficient accessibility of highways and the extremely rapid development of motor-vehicle traffic.

This discrepancy is heightened by the necessity of filling up major gaps in the highway system (dating back as far as the Weimar Republic and the Fascist regime), gaps which might be evaluated at around five billion [marks].

Future heavy traffic calls for spacious highways, suitable for heavy loads and high speeds--a goal to be achieved by a bold tracing of stable, level, and nonslippery surfaced roadways.

The solution of these tasks will definitely contribute toward reducing transport costs and transport time of all means of production and consumer goods, thus helping to considerably increase the economic value of motor-vehicle traffic.

The present rapid wear of motor vehicles, as well as the frequent damages they suffer, are caused mainly by poor highway conditions, especially in municipal sectors.

There is no doubt that a thorough improvement and development of our highway network will require extensive financial and material means, most of which are considered as investments which do not bring sizable profits. However, it is a

fact that such investments are highly profitable to the national economy, since over a period of years the increased profitability and efficiency of motor transport, as achieved by a good highway network, is sure to have a salutary influence on the over-all economic life of this republic.

According to a conservative estimate, the additional cost of early repairs of motor vehicles owing to poor or inadequate highways is around 13 pfennigs per kilometer for trucks, or around 300 million [marks?] per year--a sum amounting to over 50 percent of the means earmarked for highways and bridges in 1959.

Thus far, no scientific approach has been made to these important problems and the requisite statistics on all relevant items have also been neglected. It is, however, imperative that the technological and economic relations between the transport capacity and the costs of motor transport (including spare parts) on the one hand and the highway investments and maintenance, taking into account traffic and load capacity, and durability on the other hand be scientifically investigated.

The numerous relevant experiences of foreign countries, especially socialist states, should be utilized for this purpose. The results of such research will impart valuable knowledge, that will be helpful in exact long-range planning of motor transport and highway construction, and for the correct distribution of traffic assignments between motor vehicles and other means of communication.

According to the control figures of the State Planning Commission, construction and maintenance contributions to state, Bezirk, and municipal highways must be increased to 175 percent during the Seven-Year Plan period.

The VEB Highway Construction and the maintenance enterprises will have to increase their contributions in this period to 206 and 169 percent respectively and their respective productivity to 188 and 163 percent per worker.

The solution to the problems involved by these notably enlarged tasks is the prerequisite of a marked decrease of the contrast between highway conditions and the predictable rapid development of motor traffic.

In order to secure the optimal utilization of the material and financial means made available within the framework of the Seven-Year Plan and the reconstruction program of the enterprises, an adequate ratio should be established between enterprise investments (especially mechanization, means for research and development, and costs of cadre education) on the one hand and investments for the sole purpose of construction on the other.

It should also be basically established how individual measures taken in this respect in various fields will, directly or as quickly as possible, increase production--i.e., improve highway conditions.

As to construction work on highways and bridges, it will be necessary, while considering all factors involved in modern road traffic planning and road traffic technology, to globally and basically construct entire highway systems if possible and, moreover, to concentrate on certain points of special importance. This goal will be attained by the preferential construction of the long-distance network, consisting of the Autobahns and important long-distance highways with especially heavy traffic. Considering such tasks, the improvement of highway conditions will be given priority over the main goals of industry and agriculture. In this connection, the greater part of all construction jobs should be the reconstruction of highways and bridges, aiming at a notable increase in the percentage of heavy surfaces (i.e., surfaces able to carry all kinds of vehicle loads) and at sufficient space, considering the steadily growing traffic requirements--especially the increase in the number of vehicles. Thus, the effective width of the roadway of long-distance highways will be increased from 5.7 meters to 6.2 meters.

Long-distance highways, which, will have to be basically and thoroughly reconstructed, should reflect the economic upswing and rise in the standard of living connected with the fulfillment of the foremost economic task. They must be constructed for speeds of at least 100 kilometers per hour--i.e., have two high-speed lanes at least 7.5 meters wide.

Highways with very heavy traffic should, moreover, have a third lane for slow traffic.

Both sides of the roadway should have fixed edge lines, colored for greater visibility. All roadways must have a clearly visible and interrupted white middle line. The

minimal radii for the horizontal or vertical markers, the visibility on curves, at heights, and at crossings should be adapted to the speeds made possible by structural features. At important junctions, especially with the Reichsbahn, level crossings will have to be replaced by overpasses. For the safety of motorists, vertical and horizontal signs must clearly mark the limits and outlines of the highways by colored and reflecting devices. Signs should be kept to a minimum and be uniform in measurement, inscription, and height, in accordance with regulations. All signs must be fully visible from long distances, by day as well as by night--i.e., painted with reflecting or fluorescent colors. All new long-distance highways should have, in principle, heavy surfaces, able to carry a maximal load of 10 tons. Layers exposed to wear must be fully level.

To decrease the large number of casualties on long-distance highways and other important thoroughfares, superfluous fruit trees and, to a certain extent, other trees as well should be systematically eliminated, according to traffic and landscape planning requirements. This should, however, not interfere with fruit-growing activities and compensation should be made by means of replacements and new plantations along municipal roads.

Travel comfort on the Autobahns must definitely be improved. It will be necessary to decide in favor of the Mitropa as regards rights concerning rest houses and, in cooperation with the bezirk organs, to enlarge the capacity of these houses. In our opinion, numerous rest houses, such as those at Niemegk, Freienhufen, Finowfurt, should speedily be given additional space, and additional rest houses should be built. They must be equipped with all hotel facilities and offer full comfort and relaxation to travelers. (See also: "Concerning Rest and Haste," Der Deutsche Strassenverkehr, 7/59.)

When the State Planning Commission and the Main Administration of Highways laid down the control figures for highway construction, difficulties arose in finding the correct proportions of the distribution between individual highway systems of financial and material means, as well as of construction capacities. There is no doubt that the condition of bezirk highways, especially of municipal roads, is by no means satisfactory and definitely worse than that of the national highway network. Still, we cannot and should not be influenced by these factors alone. The density of traffic, the situation and importance of the highways in transit traffic,



workers' commuting, and traffic between industrial centers are also important criteria for the priority of construction.

Considering the major gaps which have to be filled in the municipal highway network, especially in large cities, these factors have been carefully weighed on the basis of control figures, but proposed construction in this field cannot as yet be fully carried out. Cities and bezirks are asking for a multiple of the available potential.

Even an optimal utilization of financial means will not permit concentration on more than the most urgent measures for the improvement of the municipal highway network. The foremost problems are the intensified reconstruction of destroyed cities, growing commuter traffic, and short-haul freight traffic, and the layout of bicycle lanes, sidewalks, and parking lots.

Decisive factors in the increase of construction in the municipal sector are above all the capacities for highway construction and the material supply available on this level. Whether it will be feasible to provide additional financial means for such purposes in finally balancing the Seven-Year Plan depends primarily on the development and extended possibilities of those factors. The National Reconstruction Plan will be of great importance in this respect because of the excellent prerequisites it offers for utilizing the population's initiative, and for obtaining important and qualitatively adequate achievements (especially in the construction of light surfaces) through the cooperation of unskilled hands under expert leadership.

In principle, an increase of the comparatively dense highway network of the GDR (0.446 kilometers per square kilometer, or 1,000 inhabitants per 2.7 kilometers) is not planned. Exceptions are new highway constructions connected with industrial and agricultural centers or opening up new residential areas. The needs of the Chemistry Program, of the Rostock seaport, and those of other industrial centers are foremost in this respect. Moreover, the extension of many industrial establishments (this especially applies to lignite surface mining) calls for the relocation of many thoroughfares. Extensions will be concentrated on the construction of bypasses, chiefly within cities.

Category I roads (excellent accessibility) and the share of heavy and medium-heavy surfaces in the various kinds of

highways should attain the following standing in 1965 as compared to 1958:

The share of Category I national highways will rise from 31.4 percent in 1958 to 47.0 percent in 1965. The corresponding figures for beziirk highways will be 13.8 and 28.0 percent respectively. Heavy-surface national highways will increase from 28.9 to 36.3 percent, and semi-heavy surface highways from 33.4 to 34.5 percent. The corresponding values for beziirk highways are 13.5 and 18.0 percent heavy surfaces, and 16.9 and 24.0 percent for semi-heavy surfaces. The situation in highway bridge construction is now as follows: bridges destroyed in the war and temporary bridges have been replaced, with negligible exceptions, by permanent ones in the national highway network, but in beziirk and municipal networks many temporary bridges with low load capacity are still in use and are to be replaced during the Seven-Year Plan period as primary objectives. Furthermore, the Seven-Year Plan for highway construction shows three main characteristics as far as improvements in the structures and load capacities of bridges are concerned:

1. Reconstruction of all bridges of national and beziirk highways damaged by war, as well as important municipal road bridges, first of all in cities.

2. As in the measures taken toward basic developments, new construction, and widening in the highway system, bridges must also be improved accordingly and brought to the full load capacity in compliance with regulations.

3. Reconstruction of bridges with insufficient load capacity, inasmuch as they do not reach the standards of the following bridge classifications:

- a) in the long-distance highway system, Class 45 (45 tons)
- b) on other long-distance highways and important municipal roads in cities, Class 30 (30 tons)
- c) on beziirk roads, Class 12 (12 tons)
- d) on other municipal roads according to the importance and density of traffic

On the whole, it should be stated that the financial and material means granted for reconstruction in this field correspond to the standing and importance of highway construction in the national economy. On the basis of scientific calculations and other theoretical concepts, it would, of

course, be possible to prove that the investments planned are insufficient and that increases would be highly profitable for this country's economy. However, this problem should be considered from a complex viewpoint, conceding that certain branches of the economy--first of all chemistry, electro-technics, and the basic materials industry--have priority rights and that highways, after all, have an important but nevertheless indirect influence on production results. Improvements of highway conditions will be made so as to relatively answer the requirements of increasing traffic needs, while utilizing all given possibilities. This is a goal which, considering the difficult conditions now prevailing, in the material and manpower sector of the activities for the fulfillment of the Seven-Year Plan in its economic totality, will demand great efforts in highway construction.

EAST GERMANY

Report on Shipping Losses in East German Ports

[This is a translation of an article, unsigned, in Schiffbautechnik, Vol IX, No 9, September 1959, Berlin, pages 496-497; CSO: 3396-N]

Statement of Shipping Losses 1957 to 1958

As shown below, shipping losses increased by 169, or 35.7 percent, in 1958 as compared to 1957.

Considering that the number of ships owned by our merchant and fishing fleets has not increased in the same degree, this increase in shipping losses in 1958 also means more losses per unit. At the same time, it is a reminder to us that efforts to eliminate such losses should be intensified. More efficient instructions and directions should be provided and losses must be evaluated and examined. This cannot be done by the Loss Survey Authority (Havarie Inspektion) alone; it calls for the help of all executive cadres of the shipping enterprises. It should also be noted that 359 shipping losses were reported to the Loss Survey Authority in the first half of 1959; therefore, it is probable that the 1958 total will be surpassed by far.

Considering also that in 1958 shipping losses resulted in costs of 10.4 million DM (meaning financial losses of 10.4 million DM), we hope our responsible colleagues of the shipping enterprises will admit that to prevent and reduce shipping losses is a duty which cannot be brushed aside but must be taken very seriously indeed. Intensive and consistent cooperation is urgently needed.

Out of the total of shipping losses which occurred at the VE Sassnitz Fishing Combine, 46 were losses based on damage to the main engine gear (Getriebe), for which neither the VEB Fishing Combine nor the ships' crews can be held responsible. However, gear damages made the ships less safe, made it necessary to tow them in, and also caused production losses. Moreover, the 216 shipping losses also include 25 damages to the Benn couplings (Bennkupplungen) of net winches; again neither the VE Sassnitz Fishing Combine nor the crews are

liable for these. Thus the shipping losses for which the VE Sassnitz Fishing Combine and the crews can be made responsible are reduced to 145--i.e., 23.6 percent of the total number of shipping losses.

The total number of shipping losses reported must be retained, as reported cases had to be considered as shipping losses according to HVO [not identified].

A. Reported Shipping Losses	1 9 5 7		1 9 5 8	
	Number	Percent	Number	Percent
1. Collisions with ships and floating equipment	114	25.8	134	21.5
2. Collisions with installations and maritime signals	71	15.7	80	13.0
3. Grounding and stranding	84	18.8	117	19.1
4. Sunk	5	1.1	-	-
5. Capsized	2	0.5	-	-
6. Damage to ships and ship equipment, net damages and net collisions	88	20.0	144	23.5
7. Engine damage, including gear damage in main engine and net winch	66	14.8	122	20.0
8. Fires on board ship	7	1.5	13	2.2
9. Accidental deaths	6	1.3	3	0.5
10. Serious accidental bodily injury	2	0.4	1	0.2
Total	445	100.0	614	100.0

B. Causes of Shipping Losses	1 9 5 7		1 9 5 8	
	Number	Percent	Number	Percent
1. Losses arising from nature of enterprise--i.e., caused by the specific profile of the latter, where no one can be considered liable	46	10.3	67	10.9
2. Losses caused by fog	25	5.6	44	7.2
3. Losses caused by nonobservance or insufficient observance of winds and currents, therefore caused by negligence	53	12.1	82	13.4

[table continued]

[Causes of Shipping Losses continued]

4. Technical defects as causes of shipping losses which could have been avoided by better care and, to some extent, more efficient repairs	63	14.2	62	10.1
5. Losses caused by navigational errors	105	23.4	161	26.2
6. Losses caused by technological errors	59	13.3	83	13.5
7. Losses caused by wear and faulty materials	70	15.8	86	14.0
8. Losses caused by ice	16	3.6	21	3.4
9. Losses suffered on salvage trips	-	-	4	0.6
10. Accidental deaths	6	1.3	3	0.5
11. Serious accidental bodily injuries	2	0.4	1	0.2
	445	100.0	614	100.0

C. Shipping Losses by Time of Day	Total	Day		Night	
		No	%	No	%
In 1957	445	319	71.7	126	28.3
In 1958	614	339	55.4	275	44.6

D. Shipping Losses by Month in 1957

Description	Jan	Feb	Mar	Apr	May
1. Collision with ships and floating equipment	8	12	9	6	9
2. Collision with installations and maritime signals	8	2	8	6	5
3. Grounding, sinking, stranding, and contact with submarine obstacles	9	6	7	8	5
4. Damage to ship and ship equipment	6	8	10	2	10
5. Net collisions	1	-	2	-	2
6. Engine damage	5	6	5	6	8
7. Accidental deaths	2	-	1	-	1
8. Serious accidental bodily injury	-	-	-	1	-
9. Fires	1	-	2	-	-
Total number	41	33	49	29	39
Percent	9.1	7.3	10.8	6.4	8.7

[table continued]

[Table continued]

Description	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Per- cent
1	7	9	8	10	12	7	17	114	25.6
2	6	7	5	6	7	4	7	71	15.9
3	6	5	5	8	10	10	12	91	20.6
4	7	8	3	8	2	2	6	78	19.2
5	-	1	1	-	1	1	2	10	2.2
6	6	3	4	6	4	4	6	66	13.2
7	-	-	1	-	-	-	-	6	1.4
8	-	1	-	-	-	-	-	2	0.4
9	-	-	2	1	-	-	-	7	1.5
Total number	30	38	28	40	34	40	51	445	100.0
Percent	6.6	8.4	6.2	8.9	7.5	8.9	11.2		100.0

#### Shipping Losses by Month in 1958

Description	Jan	Feb	Mar	Apr	May
1. Collision with ships and floating equipment	12	10	6	7	5
2. Collision with installations & maritime signals	3	8	7	4	6
3. Grounding, sinking, stranding, and contact with submarine obstacles	11	10	13	8	6
4. Damage to ship and equipment	15	12	14	4	7
5. Net collisions	2	-	1	4	-
6. Engine damage	9	13	16	7	13
7. Accidental deaths	-	1	1	-	-
8. Accidental injury	-	-	-	-	-
9. Fires	1	2	-	1	1
Total number	53	56	58	35	38
Percent	8.6	9.1	9.5	5.7	6.2

Description	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Per- cent
1	16	14	14	12	11	13	14	134	21.8
2	3	7	12	8	6	10	6	80	13.0
3	7	6	9	10	10	12	15	117	19.0
4	7	14	15	10	9	11	12	130	21.1
5	2	-	1	2	1	1	-	14	2.3
6	7	14	12	13	5	4	9	122	20.0
7	1	-	-	-	-	-	-	3	0.5
8	-	-	-	1	-	-	-	1	0.2
9	2	-	2	-	3	1	-	13	2.1
Total number	45	55	65	56	45	52	56	614	100.0
Percent	7.3	9	10.6	9.1	7.3	8.5	9.1		100.0

E. Participation of Individual Shipping Enterprises in Shipping Losses, 1957 & 1958				
	1957		1958	
	Number	Percent	Number	Percent
1. VEB German Maritime Shipping Enterprise	58	13	74	12
2. VE Rostock Fishing Combine	58	13	55	9.1
3. VE Sassnitz Fishing Combine	120	27	216	35.2
4. VEB German Maritime Dredging Enterprise	51	11.5	67	11.0
5. VEB German Salvage and Diving Enterprise	28	6.4	35	5.7
6. VEB German Inland Shipping Enterprise	25	5.4	19	3.1
7. Foreign ships under pilot assistance	29	6.5	33	5.3
8. Fishing vessels and equipment stations, also fishery producer cooperatives of the GDR	39	8.8	66	10.7
9. Individually owned fisheries	8	1.8	6	1.0
10. VEB "White Fleet" Passenger Line	15	3.3	17	2.8
11. Shipyards of GDR	10	2.3	10	1.5
12. Individually owned inland shipping	4	1.0	11	1.6
13. Short-haul traffic enterprises	-	-	5	1.0
	445	100.0	614	100.0

F. Hearings before Loss Survey Authority			1957	1958
1. Collisions between GDR ships			3	21
2. Collisions between GDR, West German, and foreign ships			7	18
3. Collisions with installations and maritime signals			4	15
4. Deaths and serious bodily injuries			8	4
5. Sinkings (one total loss)			2	-
6. Strandings (1957 total loss)			1	1
7. Groundings			12	25
8. Engine damages			8	17
9. Fires			1	3
10. Screw damages			3	1
11. Ice damage			1	-
Total losses heard			50	107



G. Disciplinary Actions	1957	1958
1. Withdrawal of license without probation	1	8
2. Withdrawal of license with probation	5	9
3. Severe reproof	8	18
4. Reproof	5	38
5. Censure	1	8
6. Liability established but no action taken, as importance of offense was negligible	5	9
7. No liability established	29	45
	52	135

Moreover, the Loss Survey Authority imposed or proposed five fines in 1957 and twelve fines in 1958 for offenses against the ASAO and HOV [abbreviations not identified]. The number of disciplinary actions was greater than that of the hearings, since in some cases two or more participants were involved.

Current Status and Long-Range Plans for Elec-  
trification of East German Railroads

[ This is a translation of an article written by Joachim Hoffman in Der Operative Dienst, Vol. III, No. 10, October 1959, Berlin, Pages 232-235, CSO: 3399-N/a ]

On October 7 ten years of diligent work have gone, which was performed by our workers together with the intelligentsia in the continuous struggle of all peace-loving men for maintaining and ensuring peace.

Thanks to the great initiative of the workers, the standard of living of the entire population has been constantly improved in these ten years. New huge industrial centers were created which greatly increased the national wealth of our republic.

The 1959 National Economy Plan provides for an 11.1 per cent-increase of industrial production in order to successfully solve the main economic problem set up by the Fifth Party Convention of the SED') by 1961, and to give evidence for the superiority of socialist economy over the capitalist system.

The constant production increase in all branches of the economy is a great challenge to the East German Railroads. To meet increasing transport needs the railroads are forced to raise the technological standards and to utilize the latest findings in science and technology. There are two ways to increase transport performance:

- Expansion of the tracks
- Increase of the thoroughfare capacity of the tracks through a new signal system, diesel operation and electric trains.

The first mentioned possibility is connected with very great investments which permit increased performance but do not represent a development at the level of maximum developed technology. On the other hand, the second possibility permits increased track occupancy through the application of latest techniques. The East German Railroads have

( ' ) SED - Socialist Unity Party of (East)Germany ( )

been successful in pursuing this policy by changing the type of traction from steam engines to electric trains a few years ago. On the basis of the Seven-Year Plan the following additional routes are selected for electrification:

- 1959 Halle-Weissenfels, Merseburg-Mücheln
- 1960 Leipzig - Engelsdorf - Gaschwitz  
Leipzig-Schoenefeld  
Leipzig, Central Station - Boehlen-Espenhain  
Branch Line Tabakmühle - Bayrischer Bahnhof-Connwitz
- 1961 Boehlen-Altenburg  
Neukieritzsch-Borna
- 1962 Altenburg-Goessnitz-Werdau-Zwickau  
Leipzig-Wahren-Leutzsch-Plagwitz-Gaschwitz
- 1963 Werdau-Neumark-Reichenbach  
Zwickau-Karl-Marx-Stadt  
Halle-Bitterfeld
- 1964 Karl-Marx-Stadt-Dresden
- 1965 Leipzig-Riesa-Dresden  
Leipzig-Grosskorbetha.

To give the layman a clear idea of the extent of this project the partial objectives of electrification will be described as follows: The given values are mainly taken from the projected route Leipzig-Altenburg because this route has not been electrified in the past and thus provides a more exact example. The cost share for the power supply installations and the procurement of the electric engines is not taken into account because they are reused.

#### Power Supply

Prior to the war the railroad current system with the 16 2/3 cycle has proven best; thanks to the generous aid given by the Soviet Union the former electric engines and other installation equipment was again made available; consequently, this current system was retained. The railroad power station of Muldenstein was reconstructed to provide the current for the railroads again.

Since the introduction of electric train operation on the route Halle-Koethen in September 1955, the Muldenstein Power Station supplies the substation of Koethen over the 60 kilovolt long-distance line Muldenstein-Koethen which belongs to the railroads.

In 1956 the power station had again three railroad machines whose power production greatly exceeded the current

requirements of the railroads. The excess power was transformed at the power station and fed into the chemical ring near Muldenstein (30 kilovolt). As late as 1958 approximately 11,000 MWh were still given to this system each month.

Up to the time of start of operations on the route Bitterfeld-Rosslau in March 1958 the switching post Bitterfeld which is supplied over a 15-kilovolt feeding line from Muldenstein, was not completed yet. At the crossing point of the overhead line Muldenstein-Koethen at the Jessnitz station a connection was established for a mobile substation which fed this sector of the route up to June, and the entire electrically operated route Leipzig-Bitterfeld-Rosslau up to September 1958. At the end of 1958 the switch point Bitterfeld was ready for operation and took over the function of the substation at Jessnitz.

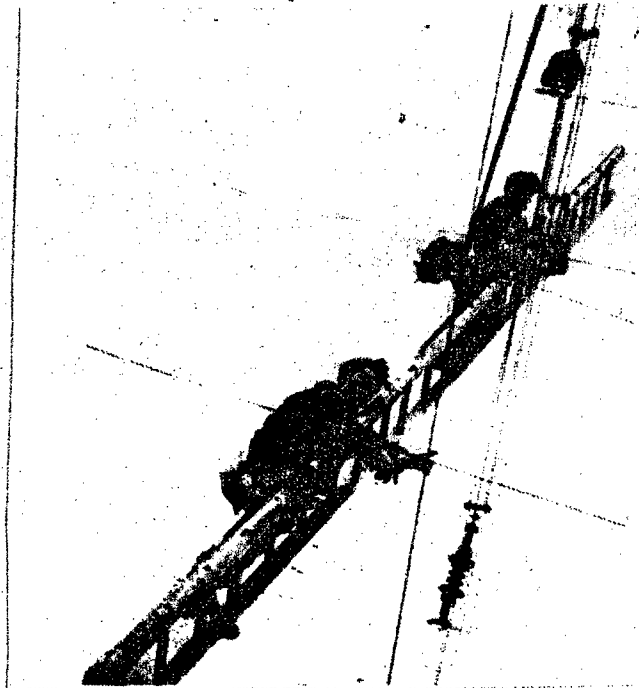
To supply the route Halle-Leipzig electrified since November 1958, with electric power, the 110 kilovolt long-distance line Muldenstein-Wahren was established leading to the Wahren substation. Here again, the completion of the stationary substation was not possible prior to the start of operations on account of lacking capacity; therefore, for the time being, a Jessnitz station which became available, and a substation (newly established), were connected with the long-distance line Leipzig-Wahren and utilized for power supply to the route Halle-Leipzig.

To supply power to the routes Halle-Weissenfels and Merseburg-Mücheln to be changed-over to electric operation this year, the long-distance line Muldenstein-Wahren is extended to the Grosskorbetha Substation under construction. In connection with the extension of electrification to Karl-Marx-Stadt and Dresden the construction of an additional substation at Goessnitz is planned, which will also be connected with this long-distance line.

### Substations

The existing former building was used again for the Koethen Substation. The latter is located at the center of the route Halle-Magdeburg to be fed. The tracks of the available route and the station are fed separately over power switches. The location of the substation to be erected at Leipzig-Wahren, was determined by the heavy load concentration in this area. The substation will be provided with power switches

for feeding the main tracks Halle-Leipzig, Wahren Freight Station, the routes Wahren-Leutzsch-Plagwitz-Gaschwitz and Leipzig-Grosskorbetha up to the coupling point at Markkranstädt as well as the Northern freight ring and the switch post Leipzig.



The Mounting Work at Overhead Lines shows Energetic Progress

The location of the Grosskorbetha Substation is determined by an existing substation building which it is convenient to use again. Over power switches the substation feeds the available routes and the Grosskorbetha station. Then a feed line is connected to the 15 kilovolt collecting bar, attached to the contact line system up to Merseburg-Sued to supply power to the Geiseltal route.

#### Switch Posts and Coupling Points

At the most important junctions attention must be given to safe power supply of the station groups and improved operational organization.

For the stations of Leipzig, Halle and Bitterfeld switch posts are planned which feed the main switch groups for the stations over power switches from a collecting bar with 15 kilovolt. For the time being, only the switch post of Bitterfeld has taken up operations; over an overhead line with 15

kilovolt it obtains its power from the Muldenstein station supplying the overhead routes from and to Leipzig, from and to Dessau-Rosslau and the main switch group of Bitterfeld Station.

For the energetic separation of the various feeding districts, protective lines are installed into the travel conduits, usually equipped with a coupling point. They exchange the accumulated voltages which may show considerable differences from each other on account of different loads. For this purpose conduits are switched together at the coupling point over power switches. In case of disturbances the latter must react immediately and separate the existing coupling.

### Travel Conduits

The usual travel conduit of the East German Railroads is a chain line constructed according to the instructions of the East German Railroads for the establishment of a travel conduit for 15 kilovolt, 16  $\frac{2}{3}$  cycles (DV 970). In accordance with different structural characteristics there are conduits for 75 kilometers per hour, 120 kilometers/hour and 160 kilometers/hour maximum speed. For the main through-tracks of the trunk routes a conduit is laid for 160 kilometers/hour disregarding the presently established maximum speed. In terms of the national economy this is justified because the East German Railroads will be forced to raise the speed of the trains prior to the termination of the natural life time of the conduits, in the course of rationalization and increased performance. The travel wire is made of copper and has a diameter of 100 square millimeters or 80 square millimeters. Tests with a travel conduit of steel-aluminum are still in progress. Usually, the suspending wire is made of steel. Bronze wire is used for sectors with a particularly great contamination of the air, for instance in the Wolfen area, at Boehlen, Leuna, etc. Travel and suspended wires are tightened up by tightening weights with a constant traction of 1,000 kilos, in sections of maximum 750 meters, with travel wires for speeds of more than 75 kilometers per hour.

The suspension of the chains (travel and suspended wires) is done in intervals of 55 to 80 meters at swivel beams along overhead lines, and at the wing-truss structures at the stations. As a result of small sagging of the travel wire a good bow sequence is ensured even at high speeds.

For the suspension of the conduit lattice poles are used which are flat or angular and obtain a threefold paint as protection from corrosion. To save the steel which was required in the past, and the great investment for protection from corrosion, the first experimental poles for the overhead lines will be made of reinforced concrete. The cost factor for the travel conduit is approximately 40 to 50 per cent.

### Changes of the Space in the Clear

The resulting steps required for electrification include the erection of space in the clear underneath the buildings permitting a travel conduit in accordance with the provided maximum speed. Taking the 1-SM/DR-Profile and a protective distance into account from the live suspending wire to the grounded bridge parts of 300 millimeters, which will both be introduced, an inside height of 5,575 millimeters became necessary.

In the meantime, experiments were completed by the TZA (Central Technical Office ? ) of the VAEZ (Official Electrification Center for the Traffic System ? ); they have shown that, in the future, the protective distance may be reduced from 300 millimeters to 200 millimeters. This is a saving of considerable investment funds for the national economy because the percentage of profile liberation in the entire investment for electrification is 10 per cent on the average, in the densely built area of Central Germany. For the relatively short route Leipzig-Leutzsch-Plagwitz-Gaschwitz two road bridges must be lifted. A lowering was not possible because of existing switch roads. The costs are about 30 per cent of the total cost for this route.

In an effort to use available investment funds economically, exact inspections must be made in regard to the necessity and the extent of profile liberation at each individual structure. Twelve structures were already examined for the route Leipzig-Altenburg and the branch routes to Espenhain and Borna. Numerous possibilities for reducing alteration work were discovered.

### Alterations at the Safety Installations

Protective measures are also required for the safety equipment in the changeover to electric operation of trains. The

objective is to guarantee safe operation without accidents. The existing safety equipment meets the requirements for the present steam operation; most of it is fully utilized. An increased track thoroughfare capacity and travelling speed are not possible with the partly existing signal equipment. This results in the following measures which must be taken in the course of electrification:

- Partial change of route from shape to light signals;
- Change of route blocking to relay blocking;
- Greater presignal intervals;
- Application of prescribed protective measures to electrified routes.

The funds required for the route Leipzig-Altenburg are about 20 per cent of the total investment; however, only one half is directly caused by the electrification.

#### Changes in Telecommunication Equipment

The overhead telephone wires at the routes to be electrified, must be cabled because of the induction from the travel conduit. Additions to existing structures as well as new structures are required for accommodating cable terminals and protective transformers as well as long-distance cable switch points. Existing telecommunication installations at the stations, signaling boxes, at the watch posts and telephone booths, must be changed and supplemented in accordance with the standardized specifications for cabled and electrified routes. Existing Basa installations must be changed-over from direct-current two-wire selection to inductive selection. For all operational posts and telephone booths of the electrified route, long-distance telephones must be provided. The cost for changing the telephone system for the route Leipzig-Altenburg is about 16.5 per cent of the total cost.

#### Changes at Light and Power Equipment

All overhead high-voltage lines of the light and power installation must be cabled up to a distance of 8 meter. The protective reduction of the voltage to zero, in the electric installations, must be replaced by a protective grounding or switching within the scope of the travel conduits according to the specifications of the Association of German Electrical Engineers No. 0115. As a rule, the financial investment for changing light and power installations is one to two per cent of the entire investment. In addition to this,



the cabling of a 8-kilovolt overhead line running parallel to the tracks from Connowitz to Leipzig Central Station belonging to the route Leipzig-Altenburg whose cost is 4.5 per cent, becomes necessary.

#### Subsequent Investments for Other Plan Carriers

The electrification of the routes of the East German Railroads results in responsibilities for other title holders; these functions are carried out by same themselves. However, the funds to be raised for this purpose, will be taken to the account of electrification. This applies mainly to protective measures taken by the German Postal Authorities, alterations at existing overhead crossings of the power supply system and protective measures at the installations of enterprises neighboring the East German Railroads.

In the electrification of the routes Leipzig-Altenburg and Merseburg-Mühleln considerable costs must be met for changes at the works stations of the coal combines.

Part of the subsequent investment is borne by the plants themselves, as occupancy of plant tracks may entail improved operations and the possibility of capacity increases for these plants. The share for the route Leipzig-Altenburg was 2.9 per cent.

#### Electric Engines

The vehicle procurement program provides for the development, construction, testing and operation of new electric engines of the building series E 11 by 1961. The following electric engine types were reconditioned, in the past, for service under the electric operation system:

Building Series	Axle Sequence	Performance per Hour, Kilowatt	Weight, Tons	Maximum Speed
04	1'Col'	2,190	92	110 and 130
17	1'Dol'	2,800	111.7	120
18	1'Dol'	3,040	108.5	150
21	2'Dol'	2,840	121.8	110
44	Bo'Bo'	2,200	79.2	90
94	Co'Co'	3,300	118.5	90

Other engines, Types E 05, E 77 and E 95, will follow.

The reconditioning of these electric engines must be recommended on the basis of considerations of economy because valuable material can be reutilized to a great extent. These engines are, in no way, obsolete or unusable. These electric engines have so far operated to our fullest satisfaction.

A few weeks ago the first overhead self-propelled engine for 15 kilovolt, 16 2/3 hertz, of the GDR was completed. It is a reconditioned, tripartite ET 25 with a maximum speed of 120 kilometers per hour. This engine is thoroughly tested in operation and will then serve as a prototype for developments in the future.

#### Travel Conduit Maintenance

Maintenance points must be established in areas with operational concentrations for the constant maintenance of conduits and the speedy removal of disturbances.

In this connection the following agencies have been selected:

- Operational Management Workshop of Magdeburg
- Operational Maintenance Shop of Koethen
- Operational Management Workshop of Halle
- Operational Maintenance Shop of Bitterfeld.

The following are under construction or planned:

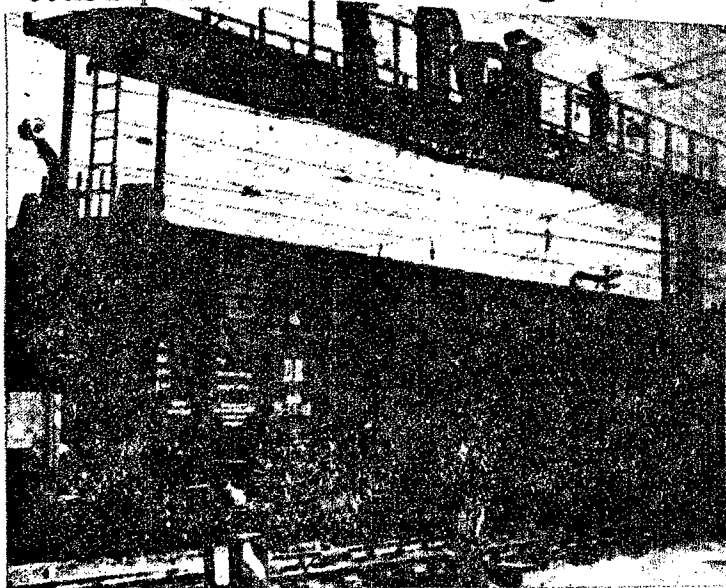
- Operational Maintenance Shop of Grosskorbetha
- Operational Management Workshop of Leipzig
- Operational Maintenance Shop of Altenburg
- Operational Maintenance Shop of Wurzen.
- Operational Management Workshop of Karl-Marx-Stadt
- Operational Maintenance Shop of Zwickau
- Operational Management Workshop of Dresden
- Operational Maintenance Shop of Riesa.

These shops are equipped with special-purpose vehicles in order to be prepared for immediate action in case of disturbances. Most of the mentioned and established shops are equipped with a diesel-driven overhead inspection engine with swivel working platform and anti-disturbance truck as a road vehicle. The vehicles are equipped in such a manner that even considerable damage caused at the travel conduits, can be re-

paired immediately. On the routes electrified so far, the cost was about 2 per cent.

### Operational Experience

The existing track occupancy is a decisive factor in the electrification. On the basis of international experience values, the profitability for the electrification of a two-track route is a specific power consumption of 250,000 kilowatt-hours per kilometer and annum. In 1958 the average power consumption for the route Halle-Magdeburg was 495,000 kilowatt-hours per kilometer and annum. On the routes Leipzig-Dessau power consumption is also much higher than the marginal value.



The New Overhead Line Tower Car Busy With Electrification in the Leipzig Area.

In the railroad district of Halle train haulage costs for electric trains were only approximately 42 percent of steam train costs in the case of freight cars, and 46 percent in the case of passenger trains. From the saving we must, however, deduct maintenance costs for stationary installations which, depending on the frequency of trains running on the routes, are 5 to 10 percent of train traction costs with steam engines. The actual saving ranges from 45 to 50 percent. Furthermore, basic changes result from electric train operation in regard to manpower requirements. In the operational workshops coal loaders, clinkers, heaters, etc. can be done without. According to computed indices for the planning of engine maintenance workers and operational workers, only half of the manpower required for steam engines, is needed for electric engines.

This saving is still greater if we consider that an electric engine replaces 1.4 steam engines, according to research conducted by the district management of Halle. Compared to relative figures computed by other railroad managements with similar traffic volume, the value is relatively low. Comparative ratios of 1 : 2 can be reached with a more favorable schedule and more economical engine coupling. An example is provided by the shuttle traffic on the route Halle-Leipzig where one electric engine replaces two steam engines.

Another important advantage of electric train operation over steam engines is the great saving in fuel. The computed fuel saving ranges from 60 to 65 percent. If we consider that at the power stations exclusively raw brown coal is used with its lower heating value, whereas steam engines require hard coal or brown coal briquettes, the effective advantage for the national economy becomes evident.

Other advantages which cannot be measured, were found in the upper part of the structure, where the degree of fouling is greatly reduced through the use of electric engines. The danger of fire in fields and forests unavoidable with steam engines, is eliminated by electric trains.

Summarizing it can be said that electric traction has clearly shown its operational efficiency, reliability and economy. Additional electrification under the long-term plan is a valuable contribution in the achievement of the great common goal of socialism.

Socialist Work Methods Improve the Work of  
the East German Railroads

[This is a translation of an article written by Manfred Richter and Gunter Westphal in Der Operative Dienst, Vol. III, No. 10, October 1959, Berlin, Pages 223-227, CSO: 3399  
- N/b ]

II. Introduction of the Dispatcher Service and  
its Principles

After the return of the study group from the USSR where it had gained a great deal of experience, the political administration organized a propaganda campaign on a wide basis on the dispatcher service method, covering a wide group of railroadmen.

Assisted by our party and the government the necessary technical basis was established in 1954; and the first cadres were trained. Already in fall 1954 13 railroad offices operated according to the Soviet dispatcher method. Finally, with the beginning of fall 1955 the dispatcher service was extended to our entire track system. With the introduction of the dispatcher service by the East German Railroads a decisive step has been taken in the establishment of a uniform command authority in the operative service. Its principles are as follows:

- The education of all railroadmen in conscious socialist discipline and proletarian vigilance, the application of the principle of individual management, the exact observance of all instructions, commands, operative instructions as well as systematic guidance and control.
- Full personal responsibility for the management of the operations.
- Uniform command of the operative services: Operation, Traffic and Engine Service, with clearly formulated assignments and a definition of responsibilities.
- Standardized manner of operation on the basis of uniform regulations and operational data.

- Uniform start of work and working schedule of the entire personnel according to the Four-Brigade-System; the brigades compete with each other in a socialist way and fight for the title "Brigade of Socialist Work".
- Economical use of freight cars and locomotives in accordance with the requirements of the economy.
- Continuous observation and steering of the service operations over the entire system of the East German Railroads together with a constant and efficient control which does not record but acts in anticipation, recognizes and changes difficult and uneconomical situations in time.
- Absence of red tape in the dispatcher work within the brigades.
- Daily analysis of the work which must be followed by pertinent and efficient measures so that deficiencies in the quality of the work as well as failures to fulfill the plan, can be overcome.

### III. The New Aspects of this Method

The dispatcher service establishes the uniform, strict command authority in the operative railroad service. The operative departments: Schedule Service, Car Service and Engine Service are combined to one unit under the responsible command of the dispatcher. The basis of this method is formed by the conscious socialist discipline and the full personal responsibility. The work of the dispatcher is decisive for the safety, promptness and economy. The dispatcher takes the decision whether the operative equipment is put into service in a profitable manner, the capacity of the installations is utilized in a suitable manner and the plan fulfilment is properly organized and applied. The dispatcher service represents a new, higher form of operational organization, as against the capitalist system of train conductor, and requires a socialist manner of work.

The superiority of the dispatcher service is reflected in a higher type of work organization and a regularity as well as the uniform command authority besides the realization of the principle of individual management in the operative services.

#### IV. Responsibilities and Approach

The responsibilities of the dispatcher service are formulated on the basis of the national economy plan. The immediate assignments are determined by the schedule for the trains and the technical plan.

The daily work of the technical plan and the operative performance required are distributed among the brigades which are given the following indices:

- 1 - Loading into cars and split-axle-type cars;
- 2 - New availability for unloading;
- 3 - Unloading;
- 4 - Processing;
- 5 - Delivery of empty cars.

The technical plan and the operative performance requirements are goal plans which make the goal of the national economy plan practical in accordance with the particular situation and conditions prevailing; their objective is to meet and exceed all positions of the national economy plan. The railroad stations are also given a technical objective each month and a daily objective in regard to operative performance.

On the basis of these plans the dispatcher in whose hands the command authority is centralized, is in a position to organize and manage, in a planned manner, the entire operative service and traffic within his area of responsibility. He connects the operation and organization with the economic responsibilities which enables him to achieve maximum economy through safe, punctual and smooth operation. He has always the possibility of getting an exact picture of the fulfilment status of his plan figures and of exerting an active influence on the economic development of the entire operative service. This requires anticipatory organization of the work, guaranteed punctuality, safety and economical operation as well as the application and general introduction of new operational experiences in railroad traffic.

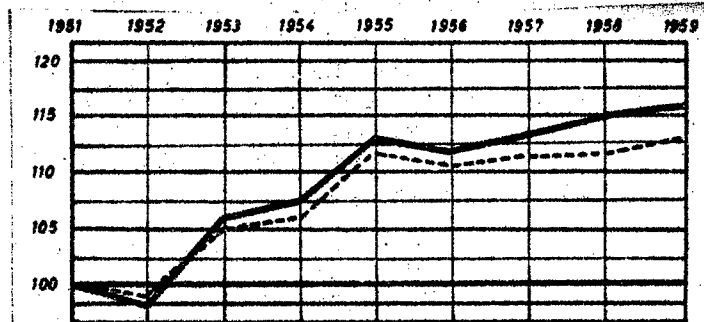
One of the most important advantages of the dispatcher service is that the dispatcher is constantly informed about the status of the operative service at the particular moment; moreover, he has an influence on the preparation of the most important work.

On the basis of his constant and complete knowledge of the

momentary situation he is in a position to organize a smooth coordination between operational and traffic services, engine and car services, etc.; he can utilize all possibilities for increasing performance in all branches of the operative services. The advantages of the dispatcher service become fully effective through the coordination of the operative branches and his constant and active influence on the operational activities as well as the utilization of new possibilities for fulfilling and exceeding the plan.

### Degree of Utilization of Freight Cars

Index 1951 = 100%



———— = net load of freight car (annual average)

----- = gross load of freight car (annual average)

Diagram 1

It is absolutely necessary that the dispatcher knows the railroadmen in his area, utilizes their abilities, initiative and knowledge, and strengthens their political conviction, working morale and discipline as well as technical qualifications through constant education.

Therefore, the dispatcher must see to it that his instructions and orders are strictly observed and controlled continuously. He can direct the manifold energies of the railroadmen and their great initiative toward the common goal of fulfilment and overfulfilment of the plan through suggestions to organize socialist contests and apply reforms, through discussions with the railroadmen of the various services, participation in production meetings, etc.

The coordination of the various shifts in the dispatcher service, the taking over and the evaluation of the work, re-



present a new aspect as against the train conductor system with its successive recording and subsequent ascertainment of the situation. The dispatcher does not record the operative development but plans the development of the work; he determines in advance and organizes.

#### V. The Superiority of the Dispatcher Service

The performance achieved in the past few years on the tracks of the East German Railroads clearly shows the great superiority of the dispatcher service as against the old train conductor system. On the whole, it can be said that we have met the transport responsibilities set up by the party and the government in the national economy plan. It is evident that it would not have been possible to meet the requirements to our railroads without the exact management and control of the operational services by the dispatcher service, to such an extent.

Performance has greatly increased, particularly in the past few years, although the capacities and installations as well as technical facilities of the East German Railroads have been expanded and improved only to a small extent.

Here are a few statistical data which give a better picture of the performance achieved:

##### Punctuality

Promptness is of decisive importance for a smooth service. Therefore, the train schedule must be strictly observed; this is the supreme law. Delays must be prevented. Each railroadman must know the unfavorable consequences which may be caused on a densely covered route by a delay of only one minute. The struggle for absolute punctuality must be fought particularly on these routes.

Train delays cause loss of work, less leisure time for the workers. Overtime for our railroadmen endanger the operational safety; it makes the overall service disorderly and is in direct contradiction to the principle of economy.

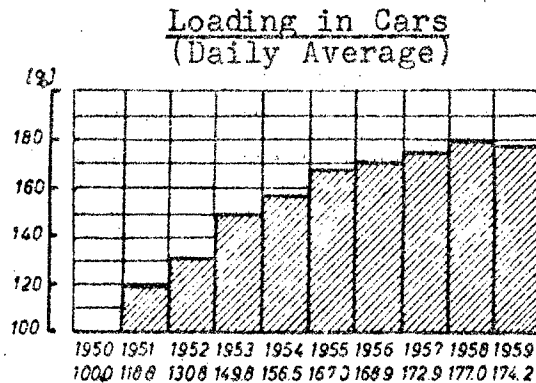
The energetic struggle for punctuality must become the cause of each individual railroadman. The promptness in the overall train service must be thoroughly evaluated both

daily and in the various shifts. Sources for errors and deficiencies must be immediately removed without red tape. In particular, the punctual departure of each train must be ensured through constant control of train formation in time, the availability and the number of cars on the train, and through a careful technical check-up of the cars, so that initial delays are prevented.

The Utilization of Freight Cars - Net Load of Freight Cars with the Annual Average and the Gross Load of Freight Cars (see diagram 1) as well as the Number of Special Trains Compared to the Total Number of Freight Cars in Operation.

The degree of utilization of freight cars was increased by 15.4 per cent as against 1951. The full utilization of the engines and cars in service is absolutely necessary for the increase of economy of railroad service. A comparison of the gross load in service with the net transport load shows a high increase in the percentage of the net load since 1952; this is evidence for an improved utilization of the cars. On the basis of the freight cars used where a relatively high increase is recorded, it can be recognized that the percentage share of special trains compared to the total number of freight cars, has not increased to the same extent. The percentage share of the special trains in the total number of freight cars dropped to the same extent as the increase of the number of freight trains. The degree of utilization of the trains and the utilization of the hauling force are also influenced by the dispatcher service.

Today, freight cars up to 1,800 tons which had been heavy load trains in the past, give planned regular performance now on many routes according to the book schedule. This means that the passage capacity of our routes is better utilized. At the same time, it is proven that the better utilization of existing capacity depends on the ability and work of our dispatchers; it can be further increased to a great extent. The point is whether the dispatcher manages to fully utilize existing reserves by good anticipatory planning and decisions. The utilization of transport space reduces car space requirements and the number of empty cars running to the loading place. It is, therefore, absolutely necessary to ascertain the degree of car utilization in a systematical manner, and to look for a greater utilization in cooperation with the senders.



(up to July)

Diagram 2

#### Daily Loading in Cars (Diagram 2)

The daily load in cars was greatly increased on account of the strict management and control of the freight car fleet although the freight car fleet in operation did not increase to the same extent. Now the dispatcher service guides and controls the entire train service under a uniform command. Whereas in the fall traffic of former years, on an average, 70 backstow and carless trains, during the traffic peak even up to more than 100, were recorded, this was no longer the case after the dispatcher service had been introduced. When peak traffic developed, on the whole, the dispatchers took relief measures in time such as the utilization of auxiliary switching stations and the detouring of freight currents. Formerly, loads in excess of the plan, immediately caused excessive idleness for freight to be forwarded because the transport capacity was not geared to the increased freight accumulation in time.

One of our greatest reserves, particularly in fall traffic, is the fullest utilization of all shifts, above all during the night and on Sundays and holidays. The shockwise nature of the work which concentrates on the hours of daylight and the weekdays up to Friday, must be distributed over the whole week.

Long standing periods of the cars at the workshops and other installations during the night, over weekends and on Sundays and holidays form the basis for the request for loading and unloading also during these periods. The interrupted utilization of freight cars impairs freight car circulation and cannot be justified in terms of economy. The car requirements on weekdays and the loading from

Tuesday up to and including Friday are about 22 per cent higher than those for the weekend. Consequently, part of the car fleet is not used over the weekend; either the cars are empty, or they must wait till they are unloaded Monday. The cars must be available in the same manner as during the working days; the same applies to the loading and unloading. The proper economical utilization of the freight cars must be considered an important job. Our principle must be to achieve high load performance with few cars.

Loading - Increase over 1950 = 77 per cent.

Forwarding - Increase over 1952 = 50.2 per cent.

### Unloading (Diagram 3)

The improvement of local work is of very great importance. With higher loading performance the local work must be geared to this performance at once. Switching places, station service plans, provisional car schedules and the network of short-distance freight cars and delivery cars must be adapted to the actual requirements in such a manner that the freight accumulated can be shipped smoothly without causing excessive stocks locally. The governing principle must be that the unloading is always in the proper proportion to the loading.

Here it is the responsibility of the dispatcher to keep informed in detail continuously on the local situation. Therefore, it is absolutely necessary to ensure a conscientious keeping and evaluation of the voucher sheets for local work so that the necessary steps can be taken in time. The local entry must be considered for the reloading; return runs or counterruns of empty cars must be avoided. The proper utilization of the dispatcher engine plays a decisive part in the improvement of the local work.

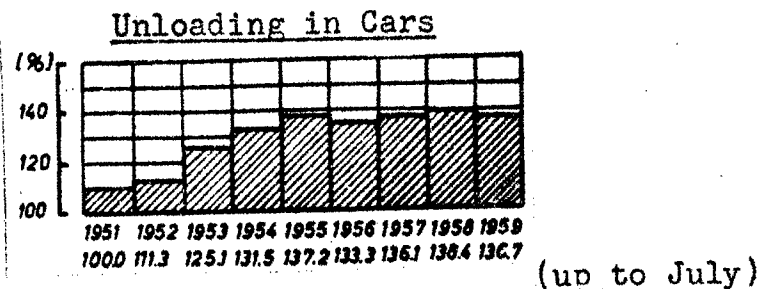


Diagram 3

## VI. The Future Development of the Dispatcher Service

### In the Economic Field

The dispatcher service greatly influences the profitability of the transportation process. If the service is smooth, fast, safe and punctual, installations and equipment are properly utilized, the result is a good performance plan fulfilment and a high profitability. This means that the economy of railroad traffic greatly depends on the quality of work in the operative service, i.e. on the proper work performed by the dispatcher.

At present, the dispatcher has not yet got an exact picture of the economic result of his work. It is possible for him to compare, among the various shifts, the degree of punctuality attained. He can observe the loading, unloading, availability, fulfilment of regulative plans, forwarding according to the assignment and control, the most economical utilization of the car fleet and the engines. On the other hand, he cannot see from these data, what investment was required and which results were obtained with the indices. The dispatcher has no control over the quality of his work in the various dispatcher shifts. The financial result would have the effect that the dispatcher becomes increasingly interested to obtain maximum performance with a minimum production cost, in other words to achieve great performance with a minimum number of engines and cars.

The financial measuring values must be computed for:  
the results obtained in one shift,  
punctuality,  
degree of utilization of freight cars,  
locomotives in service,  
new availability for unloading,  
unloading,  
loading,  
forwarding,  
regulatory plan fulfilment,  
car fleet, etc.

For each shift the result should be shown in deutsche mark giving the profit or loss of the shift. In this way, the dispatcher would have the possibility of a control for each shift in regard to the financial effects of his work. This result would form the basis for the possibility of making the dispatcher interested in material respects in an economical manner of operation through a rea-

listic premium system. However, these financial indices would have to be coordinated in such a manner that they are in the right proportion to each other orienting the dispatchers for the solution of the most important problems.

### In the Technical Field

The responsible work of the dispatcher service requires highly developed technical equipment with which the dispatcher can perform his managing and controlling work. With the new, standardized two-way loudspeaker systems the problem of completely free-speaking installations was solved in a technically satisfactory manner.

These systems establish communications between the operative points and the track dispatchers (track dispatcher installations) as well as the dispatcher management of the offices, the central dispatcher managements of the railroad administrations and the main dispatcher management of the East German Railroads (long-distance dispatcher system). These communication systems which do not depend on the Basa network are a big step forward compared to the conventional communication equipment in the operative services. There are no longer loss periods caused by manually operated communication equipment because the exchanges of the long-distance dispatcher units are automated.

The research plan for the development of technical equipment and techniques of operation in the dispatcher service makes special provision for the introduction of the latest installations for the management and control of the operative services in a planned manner and in stages, in accordance with the importance of the various routes.

### Central Track Signal Boxes with Remote-Control of the Switches and Signals for a Track Sector on the Most Important Lines

Signal Boxes will make it possible to operate signals and switches of the stations along the tracks through remote-control in a sector of 100 kilometers and more. Here the track dispatcher directly operates the safety equipment. The lines are equipped with automatic track blocks and block signals operated by the trains. The stations are equipped with a small track situation signal box each. The safety equipment of the stations can be switched to thorough-

fare so that the entrance and exit signals of the stations can be given by the trains.

#### Installation of Luminous Track Signals with Serial Train Number Signals and Automatic Train Run Recorders at all Working Places of the Track Dispatchers

The luminous track signals show:

- a. the occupancy of the block sectors by trains; the dark strips concerned flash up;
- b. The traveling position of the entrance and departure signals at the stations; small green lamps flash up with the signalling symbols.

This permits the track dispatcher to ascertain, at any time, the position of the trains and whether the signals were switched to the "Go"-position in time.

This enables the dispatcher to recognize the required operative steps to be taken, faster and better, and to take action; he is also enabled to exercise better control over the work of the operative schedule managers and signal box personnel.

The luminous signal is supplemented by the train run recorder which records the periods of occupancy and "open track" signals of the various block sectors automatically.

The automatic recording of occupancy of tracks and stations and the automatic registration of thoroughfare periods of the trains at the stations en route eliminates the long-distance calls over the telephone about the reports on the position of the train, with the dispatcher for the purpose of entry into the voucher sheet for train operations. The luminous track signals are supplemented by the automatic serial train number signals on particularly important routes. At the signalling point at the beginning of the route, the train number is dialled and automatically travels from sector to sector together with the train.

When the train enters a track for overtaking, the train number jumps over into the field concerned to remain there till the train continues to move or till it is extinguished manually in the case of terminals.

## Use of Track Radio Equipment for Communications Among Dispatchers, Engine and Train Conductors.

Within the small area of the switching stations it has appeared to be practical to be able to contact the engine at any time; therefore, it is also of great advantage to have constant contact with the running trains. At any time, the track dispatcher and the engine conductor can exchange information on special developments and certain observations which are of importance to the operation. At the beginning of September 1959 the first experiments were made with the track radio equipment by the Railroad Management of Dresden with three locomotives.

Developments are tested with the idea to introduce automatic position signals of the trains or engines over the radio. At the beginning of the run, the run manager incorporates the train number into the track picture. At the prescribed spots of the route the engine gives a radio signal which equals a position signal.

If, in addition to this, the engine could be given optical control cabin signals by way of radio (red, green, etc.) the operational safety would be increased.

## Introduction of Industrial Television in the Operative Services of the East German Railroads

This branch of high-frequency development is also applied to the railroads. Television is introduced for observing optically uncontrollable points which are of importance for the operation, for instance at signal boxes, and for the recording of train numbers. The entering and departing trains pass a television camera, at low speed, and the train number can be read at the office in the television set. This requires highly sensitive television cameras permitting pictures under normal daylight and also under lamp light.

Naturally, all other measures for modernizing, mechanizing and automating railroad traffic improve and facilitate the work of the dispatchers in an indirect manner, such as

- a. automatic signal boxes for the development of operations, as well as switch brakes;
- b. mechanized equipment for loading and unloading;
- c. mechanization of the coaling equipment, etc.



All this establishes more favorable conditions for safe, smooth, punctual, speedy and economical operations.

In spite of existing difficulties the success obtained so far, and the experiences gained in the dispatcher service, have shown that this socialist technique of operations has stood its test and further possibilities can be utilized for improving the operative services of the East German Railroads. The idea is to meet all requirements of the economy and population safely, promptly and with increasing profitability.

#### Development of a New Signalling System for Prompt Ascertainment of the Flow of Freight Through the Introduction of the Punched Card System

On the basis of an order period of 48 hours for freight cars, a new signalling system is developed and tested to establish operative conditions for

- a better coverage and control of freight flows;
- an exact definition of responsibilities for each day and shift at all points of the operative service,
- the application of the Mamai technique and the brigade accounting;
- better car availability, long-distance train formation and the prompt ascertainment of fluctuations in the development of operations so that operative steps can be taken immediately, and
- the training of the economy in regard to a regular car ordering with the indication of the time.

The dispatcher must not be burdened with additional recording work; therefore, the results must be ascertained by new technical devices. Coded reports are given to the competent teletype office by the service offices; then the data such as the number of cars, gross weight, type of freight, type of cars, sending and receiving offices, etc. are forwarded to the central evaluation point.

The symbols of the punched strip are processed through a tape transformer whose impulses make the punched cards automatically on a motorized puncher. After all data have been evaluated, the results are forwarded to the dispatcher managements.

## HUNGARY

### Standardization in Hungary, with Special Attention to Food Products

[This is a translation of an article by  
Georg Kollath in Standardisierung, Vol  
V, No V, September 1959, Berlin, pages  
394-399; CSO: 3118-N/b]

#### 1. Introduction

Upon the invitation of the School for Domestic Trade, I want to speak to you today about standardization in the Hungarian People's Republic with special attention to the standardization of food products. You are, I am sure, familiar with the various problems of standardization. Therefore, I want to talk to you first about our problems in the field of standardizing food products. My lecture would be incomplete if I did not touch on the development of standardization in Hungary. On the basis of this knowledge we can then better understand the objectives and the problems of our standardization.

You know that standardization depends on the economic and social conditions of a country and on the state of technical development of its economy. This is also true of our standardization. I must emphasize this, since the socialist transformation and the economic development of our country had a great influence on the development of standardization. Suffice it to draw a comparison between the number of standards before 1944 and the present number.

Before the liberation of our country we had approximately 900 standards which had been developed in a period of 34 years between 1910 and 1944. After the liberation these standards were at first revised, and since 1948 new standards have been systematically developed. Thus we have at present approximately 10,000 standards which have been developed during the past 15 years. In addition to these figures, I have to mention that we had no food product standards before our liberation.

## 2. The Development of Standardization in Hungary

Permit me to give you a brief comprehensive presentation. Standardization in our country goes back to the Association for Electrical Engineering, which began standardization work in 1910. The first norms were published in the magazine Elektrotechnik. On the basis of examples from foreign countries, the Association of Hungarian Engineers and Architects began in 1920 to concern itself with standardization. At its suggestion, a Hungarian Committee for Industrial Norms was founded in 1921 by the Minister of Commerce. This first official organ of Hungarian standardization could only achieve limited results. Several designs were developed by this organ. No government representatives or manufacturers were members of this committee. For that reason, they were not sufficiently interested in standardization. At a session of the committee on 19 November 1931, it was decided to cease further work after unsuccessful activities, particularly since no more money was available.

Two years later, the Minister of Commerce founded a new independent institution under the auspices of the Committee for Rationalization. This institution was called the Institute for Hungarian Standards. The expenses of this institute were assumed by the Ministry of Commerce. In 1941 the institute was reorganized and the Association of the Institute for Standards was founded under the control of the Minister of Industry. The purpose of this reorganization was to promote the participation of the manufacturers in the financing of standardization. After its reorganization in 1941 the institute concerned itself with an expanded range of products. The Second World War promoted the development of standardization, particularly between 1941 and 1943. Approximately 900 standards were published by this institute before 1945. After the liberation of our country, this institute was nationalized in 1948.

Before 1945, standardization developed under similar legal conditions as in other capitalist countries. Commercial contracts were based to an increasing extent on standards. In addition, there were several regulations of the Minister of Commerce or of the Minister of Industry, according to which state institutions were required to check the goods purchased by them and delivered to them against the standards. The changes which have taken and are taking place in the field of standardization under socialist production conditions are resulting in basic changes in the nature of standards.

Under our production system, the use of the standard may not be dependent on the agreement between business partners. The standards are being developed by a state organ and are obligatory. Our new state organ is the Office for Standardization.

### 3. Objectives of the Standardization of Food Products

Before 1945 we had no standards for food products. Our food industry consisted before the liberation exclusively of small enterprises. For that reason, the Institute for Standardization which existed then did not concern itself with standards for food products. Perhaps I may mention that the traffic in food products was regulated through several laws and decrees (for instance, the Agricultural Law and the Health Law). But these laws were primarily concerned only with the adulteration of foods.

The standardization of food products in our country began in 1949-1950. It was caused by the changes which occurred in the food industry after 1945. After the liberation of our country, modern methods were introduced which enabled our food industry to develop large enterprises within a few years. These changes necessitated a rapid development of the standardization of food products. For this purpose, a new department of agriculture and the food industry was established within the Office for Standardization. This department made it possible to coordinate the standardization of agriculture and the food industry. Thus the raw products of agriculture could be better taken into account.

This brings us to the objectives of the standardization of food products which have recently been expressed by Andras Miklovicz as follows:

"The standardization of food products has the objective of determining the quality of foodstuffs and of establishing the hygienic requirements. It has, furthermore, the objective of developing regulations by means of which it will be possible to protect foodstuffs from spoilage during transport and during storage."

Besides the achievement of these objectives, and besides quality and delivery requirements, it was also necessary to develop standards for test samples and for inspection methods. The Soviet Union and other friendly people's republics gave

us active support in the solution of these tasks. The decree of the Economic Council of 1952, which, besides the creation of standards, also provided for their obligatory introduction, represented a great step forward.

In the following I wish to give you a survey of the standardization of foodstuffs. Within the framework of this survey, I will speak about the standardization of the most important groups of foodstuffs, about the problems which arise, and about the new tasks.

\* \* \*

## 8. Summary

I hope I have shown you what standardization in Hungary has achieved during its 50-year history. Standardization developed slowly before the liberation of our country but with more fervor after the liberation. The development of standardization becomes evident not only in the number of standards but also in its level. We have achieved the greatest progress in the field of foodstuffs, where the first standards have been developed since the liberation. The technical level of our food industry was also taken into consideration in the development of the standards. On the basis of this knowledge, we were able to determine the quality requirement with respect to the goods as well as the grades of foodstuffs.

The standards give not only a measure of the present state of development but also serve as a guide in the further development of quality.

The most important foodstuffs are standardized in our country. I have also shown that our standards include sampling methods and the inspection of goods. These inspection standards are modern methods which are easily applied in industry and in the commercial inspection institutes. In the future, we intend to further improve the standards for the inspection of goods and plan to introduce microbiological inspection methods as soon as possible.

Furthermore, the standards include regulations for the handling of goods. These regulations pertain not only to storage but also to transport. They are particularly explicit

in the area of industrial storage. Improper terms are found only rarely. Such terms are, however, still found in the storage regulations for commercial storage. As I explained, this discrepancy results from the present state of our commerce. It is true that the improper terms are a disadvantage of our standardization. Our standardization, however, has taken the economic possibilities into account as much as possible. In my opinion, our standardization is well on the way toward achieving its objectives. Under the direction of our Office for Standardization we will develop still better standards in the future. The leadership, as well as the international connections, of this office give assurance that the best results will be achieved in the field of standardization. These results will decisively promote the further development of products in Hungary.

## HUNGARY

### Description of the Benzol Recovering Plant and Its Production Results at the Danubian Iron Works

[This is a translation of a lecture read by Laszlo Bodnar at the Conference on Coke Production and Coke Chemistry, 17 September 1958, in Szeplak, published in Kohaszati Lapok, Vol XCII, No 10, October 1959, Budapest, pages 454-459; CSO 3355-N]

The latest addition to the coking section of the Danubian Iron Works (Dunai Vasmu) is the benzol recovering plant, the final stage of the gas condensation process. The benzol recovering plant, placed into operation slightly more than six months ago, makes the coking section a complete unit.

The recovery of benzol from the gas is important not only because of the benzol itself but--as we well know--it is also a prerequisite for the operation of Thylox-type hydrogen-sulfide extracting plants. Our benzol recovering plant operates on the principle of absorption. The wash oil currently used is domestic Diesel oil. The following is a description of the outlay of the plant and the sequence of its production process. The gas containing benzol is cooled to the desired temperature in the after-cooler and is then brought into the first stage of the benzol-recovering process. This stage consists of two washing towers, linked in series and packed with hurdles. The gas passes in a direction opposite to the flow of the wash oil. The benzol-laden wash oil flows from the primary washing tower through heat recuperators into the fractional column. The sequence of the recuperators is as follows: dephlegmator, the recuperator of the debenzolized hot wash oil, and the steam pre-heater. In the fractional column the oil and benzol are separated through desorption, by direct steaming. About 1.5 percent of the wash oil is regenerated, cooled, and returned to the other oil. From the fractional column, the benzol, wash oil, naphthalene, and water vapor pass into the dephlegmator, where they transmit their heat to the cold benzol-laden wash oil. Here the vapors that have higher dew points condense and flow into the separator. The benzol vapor passes

through the dephlegmator, into the distilling column. In the case of a breakdown in the distilling column, the benzol vapor can be switched directly into the condenser. In the separator the oil and water are separated on the basis of the difference in their specific weights. In order to cut losses, it is arranged that this oil gravitates into the suction pipe of the pump for the benzol-laden wash oil. The water from the separator passes through the control separator and a benzol trap, into the sewer system. In the distilling column the crude benzol vapor is steam distilled into light and heavy crude benzol. The light crude benzol is the overhead product, in the form of vapor. The heavy crude benzol is the bottom product, in liquid form, and passes into the water separator. The dehydrated heavy benzol then flows into the product tank. The water from the separator passes through the aforementioned control separator. The overhead product--a mixture of light benzol and water vapor--is condensed in a water-cooled condenser. Cooled to a temperature of 25 degrees centigrade, the condensate flows into the separator. From there the light benzol--separated on the basis of the difference in specific weights--passes into the intermediate tank, while the water passes through the control separator. A part of the light benzol in the intermediate tank is brought back into the distilling column as reflux. The temperature in the overhead can be controlled by regulating the flow of this reflux. The rest of the light benzol flows into product tanks. If the separation of the water and oil, or of the water and benzol, is incomplete, oil or benzol may get into the control separator, but here more time is available to recover them. The oil or benzol phases in the control separator can be let into the heavy benzol tank, from which--in order to eliminate losses--they can be pumped into the laden wash oil. From time to time the light and heavy benzol accumulating in the product tanks can be pumped into the tanks of the processing plant. The exhaust systems of the tanks, separator, and condenser are connected into a collecting main which carries the uncondensed vapor into a vapor chamber. Here a spray of wash oil absorbs the vapor, and the laden oil then gravitates into the suction pipe of the pump that transports the laden oil from the washing towers.

The supply of industrial water in the benzol recovering plant can be divided into two separate cycles, in each of which only the evaporated water has to be replenished. A fan-equipped cooling tower serves to cool the used water.



At present, however, the water used to cool the oil flows away into the sewer, because the lift of the pumps designed for the industrial water is inadequate. Consequently, the consumption of fresh industrial water in the benzol recovering plant is quite high.

The absorption of benzol follows the Henry Dalton law, which is suitable for a study of the numerical relations of the process. A criterion of the absorption of benzol is that the partial pressure of the benzol vapor must be higher in the gas than above the wash oil. This can be influenced in the following manner:

1. The benzol content of the wash oil can be reduced through a higher distillation temperature.
2. The amount of wash oil used can be increased. Both methods serve to reduce the partial pressure of the benzol vapor above the wash oil. The first solution, however, entails the danger that more of the low-boiling oil distillates will depart with the benzol fumes. This would not only increase the amount of wash oil used but would also cause deterioration in the quality of the product. Under the second solution, the increase in the volume of wash oil would require more steam for heating and would also raise the consumption of industrial water for cooling.
3. The partial pressure of the benzol [vapor] can also be increased by raising the pressure of the gas, but this solution also increases the consumption of energy.

Naturally, the extent of absorption depends on the temperature of the process, on the available surface, the rate of flow of the gas, and the absorption capacity of the oil. In view of the fact that the temperature of the used and cooled industrial water limits the temperatures to which the gas and the oil can be cooled, the range for controlling the temperature of the process is rather narrow, especially in the summer months. But even on the hottest summer days, the temperature of the cooled industrial water does not exceed 30 degrees centigrade. Any increase in temperature would result in the opposite process--desorption--which would increase the benzol content of the gas and cause benzol loss. In order to prevent the wash oil from becoming diluted with water, its temperature is set 3 degrees centigrade higher in summer and 5 degrees centigrade higher in winter. In this manner, the gas is maintained at a higher

temperature, thereby preventing the accumulation of condensed steam in the oil.

In recovering benzol it is necessary to ensure, with the aid of a suitable surface, the required contact between the gas and the wash oil.

For this reason the washing towers are packed, in order to increase their contact surface. The most common packings are meshed wire in wooden frames or helicoid screens in metal frames. Our washing towers were designed to operate with the former type of packing. If such packing is not available, the wooden frames can be used with screens of 0.5-millimeter perforated plate. The total spraying surface of one washing tower is 10,800 square meters; thus the two towers have a combined total surface of 21,600 square meters. When the third washing tower has been completed, the total washing surface of the benzol recovering plant will be 32,400 square meters. Packing provides a greater washing surface within a given volume. Consequently, comparatively smaller washing towers may be designed. Another advantage of this system is that it is less prone to the formation of deposits than a 2.5- to 3-meter layer of helical packing materials. At their rated load, our washing towers are designed for a gas flow of 1.5 meters per second. The present rate is 0.4 meter per second and cannot be adjusted in the course of the recovering process.

Either tar oil or petroleum oils may be used for washing. The benzol recovering plant was designed to operate on its own tar oil. As has been mentioned above, Diesel oil is used for washing until the tar plant is placed in operation. Conversion to tar oil will necessitate certain modifications of the oil separator. Owing to the fact that the specific weight of tar oil is less than 1.0, the separator as it is now adjusted would yield oil through its water spout and water through its oil spout. Regardless of what type of wash oil is used in the benzol recovering process, the absorption capacity of the oil declines after a time, partially because of the impurities contained in the gas and partially because of the polymerization caused by constant heating and cooling. The polymer dissolves in the tar oil and increases its viscosity, which in turn makes it difficult or impossible to pump the oil. If petroleum is used for washing, the polymer separates from it in the form of sludge. This sludge deposits inside the installations and pipes, increases the flow resistance, and may eventually

cause clogging. In the old washing plants, the oils from the polymer sludge were regenerated with the aid of polymer solvents, but this process required a long period of sedimentation. Instead of this cumbersome method, we now have regenerators that operate on the principle of steam distillation. A certain portion of the wash oil is continuously distilled. The regenerator emits the useful oil but retains the polymer. The latter continuously flows into a receiver tank. The polymer product of our plant is added to the fuel-oil residue used as fuel in the steel works.

In comparison with the old plants that operate with solid adsorbents (activated charcoal), a great advantage of using wash oil in the benzol recovery process lies in that the oil is less sensitive to the tar and naphthalene in the gas. These two impurities clog the fine pores of the activated charcoal and reduce its adsorption capacity. This means that the specific volume of the charcoal consumed must be increased if we wish to maintain the rate of benzol recovery at a constant level. Although the product is purer, with the activated-charcoal method we are able to obtain only one kind of crude benzol. The wash-oil method, on the other hand, requires almost the same amount of steam but produces both light and heavy crude benzol, an advantage in further processing. Furthermore, as is evident from the technical sequence of the recovering process, the constant utilization of waste heat is ensured. Thus, the recovery of benzol with the aid of wash oil has a higher degree of thermal efficiency. Last but not least, the difference in the price of the two materials is a decisive factor in favor of the wash-oil method.

In connection with the purity of the gas, I wish to mention that the technical specifications of our plant permit the following impurity ratios, after the individual purifying installations, at rated loads:

	<u>Grams per</u>	<u>Gas Temperature</u>
	<u>Cubic Meter</u>	<u>in degrees C.</u>
Tar content	0.005	25
Ammonia content	0.04	
Naphthalene content (after the after-cooler)	0.09	30

The average impurity ratios (in grams per cubic meter) achieved by the plant are as follows:

Tar content	0.04
Ammonia content	0.05
Naphthalene content	
(achieved before the benzol recovering plant was placed in operation)	0.4

In the six months since the benzol recovering plant was placed into operation, the naphthalene content (measured after the washing tower) dropped to an average of 0.2 gram per cubic meter.

From these results it is evident that, even if we operate the purifying installations at their rated loads, we do not get a pure gas, and the specific consumption of wash oil in the benzol recovering plant does not reach the level cited in technical publications--120 kilograms per ton of benzol.

Finally, I would like to mention briefly the instruments of the benzol recovering plant. These instruments may be divided into three categories:

- 1) instruments for measuring and recording quantity
- 2) automatic instruments for measuring, recording, and regulation
- 3) measuring and recording instruments

The instruments in the first and third categories are installed and properly maintained, and their performance is faultless. The installation of the instruments in the second category is incomplete. Their sensing and recording parts are installed but their controlling or activating parts are not. Because the latter are lacking, the controls must be activated by hand. These instruments were intended to regulate automatically the most delicate operations of the plant--e.g., to maintain at constant levels the flow of oil to the washing towers and to the oil regenerator. The instruments would have been activated by the level of oil in the washing towers and in the regenerator. Also keenly felt is the lack of an automatic temperature regulator for the benzol vapor before it enters the condenser. Essential for ensuring uniform quality of the product, it would have regulated the temperature of the benzol vapor by controlling the quantity of the reflux in the column. The absence of this regulator has resulted in considerable variations in the quality of both light and heavy crude benzol. We will return to this problem later.

Installation work on the benzol recovering plant was completed theoretically in December 1957, actually early in January 1958. Aside from the technical experience acquired in Nowa Huta, Poland, the technical information available for placing the plant into operation consisted of a sketchy technical directive which specified only the temperatures after the heat recuperators, in rather wide ranges. A benzol content of 2 grams per cubic meter after the washing towers, and the quality of the light crude benzol appeared certain. According to the directive, all of the light crude benzol had to distill completely at temperatures of up to 160 degrees centigrade. Although our Central Laboratory (Kozponti Laboratorium) in July 1957 had made laboratory tests of the wash-oil samples supplied by the Oil Industry Trust (Olajipari Troszt), the results produced no significant data on the absorption capacity of the oils. The situation was the same with respect to the desorption of the benzol. Thus, we were obliged to determine the actual performance of the benzol recovering plant ourselves, on the basis of the data obtained in the course of the trial runs. Knowing the approximate absorption capacity of the wash oil and the benzol content of the gas before it enters the washing tower, we computed the amount of wash oil that had to that had to be supplied to the tower on the basis of a benzol content of 2 grams per cubic meter, which is permissible after the washing tower and is still favorable for our sulful plant. According to our computations, not quite 30 cubic meters of oil per hour had to be supplied to the washing tower. With 1.6 to 1.8 percent of benzol in the laden wash oil, this meant about 2.2 liters of wash oil per cubic meter of gas. This volume of wash oil, however, could not be supplied to the towers by throttling the valves installed in the pressure pipes of the pump designed for a performance of 70 cubic meters per hour, because the sprayers in the towers were designed for a much greater volume. Experiments showed that the minimum volume of oil that can be delivered to the towers was 42 cubic meters per hour. Thus, we began operation with 45 cubic meters of oil per hour, strictly adhering to the temperature of 130 to 140 degrees centigrade required in the specifications after the steam preheater. According to our laboratory tests, the benzol content of the laden wash oil was not quite 1.0 percent, that of the debenzolized wash oil was 0.2 percent, and the [gas] after the washing tower contained 1.42 grams of benzol per cubic meter. At this stage of operation, no attempt was made to separate the light and the heavy crude benzol. Laboratory reports flowed in by the hour. Within a few hours

the reports showed that the absorption of the benzol was proceeding smoothly but adjustments had to be made in the desorption of the oil. After the first two days of operation we noticed, after the fractional column, sudden abnormal increases in the volume of oil in the dephlegmator and its separator. This situation was further aggravated by the condensation of the heavy benzol in the dephlegmator. This heavy benzol flowed into the separator together with the oil, and here it was again vaporized by the continuous flow of hot oil, thereby developing steam pressure in both the separator and the dephlegmator. Because of this pressure, the oil was unable to gravitate from the separator into the suction pipe of the pump that moves the benzol-laden oil. At that time we attributed this phenomenon to the high pressure in the separator. The high pressure in the dephlegmator blew oil out of the separator and even benzol through the vents of the product tanks. On the basis of these results, we quickly made computations to determine the distillation volume. Regarding the factors beyond our control as constants, we saw that the process could be controlled by regulating the volume of the steam. We then reduced the temperature of the oil after the preheater from 140 to 108 degrees centigrade but left unchanged the volume of direct steam fed into the column. In this manner we were able to achieve smooth and continuous desorption. The fluctuations and blowouts of oil and benzol experienced before ceased entirely, and it was possible to regulate the entire process through a single steam valve. But even then the oil from the oil separator failed to gravitate into the suction pipe of the pump for the benzol-laden wash oil. A closer investigation revealed that this failure was caused by a simple error in leveling--the minimum oil level in the primary washing tower and the highest level of the separator were exactly at the same height. When a cylinder 300 millimeters in diameter and 800 millimeters high was added to the separator, the oil flowed to the pump. At that time, benzol contents in the range of tenths of a gram [per cubic meter of gas] were frequently measured after the washing towers. Because rust from the installations and pipes accumulated in the oil in the first two weeks, it became necessary to place the regenerator into operation. From then on, the steam for desorption and oil distillation was fed into the system through the regenerator. Thus, the entire process could again be controlled with the aid of a single [steam] valve. Under constant laboratory supervision, we placed the distilling column into operation on 19 February 1958. In view of the fact that no final decision

had been made concerning the quality of the heavy and light benzol, we attempted to obtain a product [light benzol] that distilled 100 percent at temperatures of up to 160 degrees centigrade. From 40 to 42 percent of the accompanying heavy benzol distilled at temperatures of up to 180 degrees centigrade, and 50 percent at temperatures of up to 220 degrees centigrade. The heavy benzol contained 1.0 to 1.7 percent light-benzol distillate and about 16 to 20 percent naphthalene. We operated on the basis of these specifications until 1 July [1958], when the [benzol] processing plant--it had been placed into operation in the meantime--requested a light benzol that distilled 95 percent at temperatures of up to 160 degrees centigrade, and to the last drop at temperatures of not more than 180 degrees centigrade. If we allow a tolerance of  $\pm 5$  degrees centigrade for final distillation temperature and compute the uniformity of the product on this basis--attributing a value of one to the distillation temperature and a value of zero to any deviations from this temperature--then the average index for July [1958] is 0.25, in contrast to 0.52 for August [1958]. These indices clearly reflect the above-mentioned lack of automatic temperature regulation. The acquisition and installation of this automatic temperature regulator would evidently improve the uniformity of the product. Because it contains 0.8 to 2.5 percent light benzol and varying amounts of naphthalene, the quality of the heavy crude benzol is of no special significance. The average results achieved by the plant in the first six months of its operation are as follows:

Benzol content of the gas prior to entering the washing tower (grams per cubic meter)	33
Benzol content of the gas after washing (grams per cubic meter)	0.36
Recovery efficiency (percent)	98.9
Supply of wash oil (cubic meters per hour)	47.8
Benzol content of benzol-laden wash oil (percent)	1.03
Benzol content of the debenzolized wash oil (percent)	0.2
Sludge content of the wash oil (percent)	0.05

The total amount of benzol recovered up to 31 August [1958] was 2,768.5 tons, 88 to 90 percent of which was light benzol and 10 to 12 percent was heavy benzol. The benzol yield was 9.25 kilograms per ton of dry coal (0.93 percent).



The consumption of wash oil is 78 kilograms per ton of benzol. A portion of this wash oil is carried away in the gas; the rest is the polymer that flows from the regenerator into the collecting tank.

The amount of oil used for washing is 4.35 liters per cubic meter of gas, in contrast to the 2.2 liters per cubic meter generally cited in technical publication. Above we have already seen the causes of this difference.

Our steam consumption is 8.4 kilograms per kilogram of benzol. This value is 1.4 to 2.0 kilograms higher than the steam consumption cited in technical publications.

The average amount of wash oil per cubic meter of gas and the benzol content of the benzol-laden wash oil indicate that we are using more wash oil than necessary. This also explains the aforementioned excessive steam consumption, since the difference between the actual and theoretical steam consumption is needed to heat the additional wash oil used.

In view of the fact that the benzol recovering plant is only in the ninth month of its operation, the results I have given above can be regarded only as tentative. The plant is still undergoing adjustment. The results given above only serve to confirm some of the conceptions on the basis of which we placed the benzol recovering plant into operation and began its adjustment. Complete control of the benzol recovering process necessitates permanent conditions of operation and proper methods for measuring, preferably with instruments. Our next task is to complete these prerequisites.

The other larger unit of the gas condensation process is the sulfate plant. In connection with this plant, I wish to mention that our saturator, based on the semi-direct method, is operating very well. Using the 94 to 96 percent concentrated industrial sulfuric acid that is standard in Hungary, it is possible to maintain an ammonia recovery ratio of 99.7 to 99.8 percent over a long period of time. The most troublesome phenomenon which we have experienced in connection with the operation of this saturator up to now is the periodical foaming of the mother liquor. This not only increases the specific consumption of sulfuric acid but the large-scale escape of mother liquor might damage the acid-proof surface of the acid tray, the drain pipe of the plant, and the enter sewer system of the Danubian Iron Works. Furthermore, there is also the danger that the liquid seal might



become filled with foam, permitting gas to escape, and this might eventually cause fire. At first glance, this problem and its solution seem very simple, but a dependable solution can be found only after removing the cause of this phenomenon. By the process of gradual elimination, we are studying the probable causes of this foaming. First we undertook measures to lead away the condensate that develops when the ammonia and water vapors from the gas liquor processing plant are cooled and to prevent this condensate from flowing into the saturator. In other words, these vapors contain carbon dioxide, ammonia, and ammonium carbonate. The latter decomposes in acid and suddenly releases carbon dioxide, which may cause foaming when it comes into contact with the oils and phenols produced in the distillation of the ammonia. The foaming of the mother liquor, however, persisted, although at one time the distillation of ammonia was completely suspended. We also suspected that the foaming might be caused by the depyridinized mother liquor from the pyridine plant, because it may also bring ammonium carbonate into the saturator. We eliminated the reflow of this liquor, but this measure failed to stop the foaming. In the absence of other factors, it became evident that the periodical foaming of the mother liquor was caused by the quality of the sulfuric acid used. Following this lead, we took samples from the shipments of sulfuric acid received at the plant. When the samples were placed into a shaker and water was added to them, some of the samples showed a slight formation of foam. As yet we have been unable to determine the actual cause in the sulfuric acid itself. Neither its arsenic content nor its nitrogen oxide content is higher than usual.

The tar content of the mother liquor inhibits the formation of foam. From the industrial point of view, this may appear a convenient way to inhibit foaming, but it is also dangerous because a higher tar content of the gas may increase the flow resistance, clog the flow, and cause deterioration in the external appearance of the ammonium sulfate. In order to eliminate or at least reduce the foaming, we also tried out the foam-inhibitor oil (which contains 40 percent vegetable oil) listed in the catalogue of the Mineral Oil Trading Enterprises (Asvanyolaj Ertekesito Vallalat). The results were the exact opposite of our expectations, because this oil obviously increased the foaming. To inhibit foaming we are now using once used mineral oil. When added in batches of 30 to 40 liters to the mother liquor, it noticeably improved the conditions of operations.

The further problems of operation, not mentioned in the technical directives, concern mostly the processing of the gas liquor. The placing of the plant into operation and its adjustment were rendered difficult not only by the sketchiness of the technical directives but also by the high tar content of the gas liquor. The high tar content immediately showed that the sedimentation capacity is inadequate and that it will become even more so when the No II battery is placed into operation. We plan to eliminate this bottleneck by installing a detarring column in the near future. Such a column, however, will remain only a partial solution to our problems; because of the crude products recovered, it will affect only the quality of the crude pyridine. The ammonia gas needed to extract the crude pyridine fixed in the pyridine sulfate, which--together with ammonium sulfate--is in the mother liquor, is supplied by the  $\text{NH}_3$  still. Because of the high tar content of the gas liquor, however, this gas contains too much oil. In the neutralization of the mother liquor and in the distillation of the gas liquor, a considerable amount of this oil gets into the crude product, sometimes as much as 50 to 60 percent. When the plant was placed into operation, the pyridine extractor operated continuously, processing 2 cubic meters of mother liquor per hour. At that time, the pyridine base contained in the product hardly reached 220 grams per liter. Because of defects in the leaden lining of the neutralizer and in the condenser, operation had to be suspended for a considerable time. During this period analyses of the pyridine content of the mother liquor showed that at a liquor temperature of 40 to 50 degrees centigrade the pyridine content increased to 40 to 50 grams per liter (it dropped to 15 grams per liter when the pyridine was extracted for a period of 14 to 16 hours) and that the pyridine base contained in the product was as high as 670 grams per liter. The reconcentration of the mother liquor requires three to four days. With periodical operation, the pyridine level of the mother liquor remains constant. A further improvement in the quality of the product can be expected through the detarring of the gas liquor, which also facilitates the further processing of the crude pyridine. Naturally, we will not go to the 40 to 50 grams per liter concentration mentioned above, because with such a high concentration the pyridine that escapes with the gas can amount to 50 percent of the daily yield. This fact shows that a value of 40 to 50 grams per liter represents the equilibrium concentration. In order to develop the most favorable conditions of operation, we are planning studies and computations to determine the optimum concentration for recovery.

These data do not mean that we were able to establish continuous operation within 14 to 16 hours. This was due to the fact that in the neutralization process connected with the distillation of the water vapor, uncondensable gases also got into the condenser, and this increased the pressure in entire system. When the recovery of pyridine is virtually suspended, the pressure can be reduced with the aid of a pipe that connects the condenser with the gas suction pipe. In this manner, the pyridine that escapes with the vapors can be returned to the gas before the saturator, from which it can be recovered. Thus, pyridine loss can be reduced. After one or two hours of operation, however, condensate from the vapors clogs the connecting pipe. Laboratory analyses of the condensate in this pipe showed that its pyridine content was 100 to 130 grams per liter. In order to eliminate clogging, we installed in a section of the connecting pipe a heat-exchanger tube that can be cooled with water. The condensate which flows from this heat exchanger is mixed in the separator with the product obtained from the condenser. With the aid of this small heat exchanger, the pressure of the system can be controlled as desired. This is an important factor with respect to the dissolution of the ammonia and carbon dioxide in the water that emerges from the condenser. The increasing solubility of the ammonia and carbon dioxide reduces the loss of the pyridine dissolved in the water of the separator. At normal operation, this pyridine loss does not exceed 5 to 7 grams per liter.

The Koppers-type phenol extractor, which is closely connected with the gas-liquor processing plant, was the last unit to be placed into operation. The technical directives claim that, with the aid of a suitable circulation system, the phenol extractor is able to produce a sodium phenolate solution that contains 18 to 20 percent phenol.

Not to mention the absence of the most essential instruments and the faults of the pumps installed, after nearly 12 months of operation (interrupted several times), we are still unable to raise the phenol content of the product above 14.5 percent. Even this result is only occasional. Our investigations show that in the acid extraction process preceding the recovery of phenol, the phenol content of the gas liquor often drops by 30 to 40 percent. Although the efficiency of the removal of carbon dioxide and hydrogen sulfide is substantially better, the combined total concentration of these two acidic constituents often reaches 0.45 to 0.5 gram per liter, whereby the sodium carbonate level of the circulated phenolate

is substantially increased. Under certain conditions, the carbon dioxide liberates the phenol from the solution. The phenol and the sodium carbonate form a rust-colored crystal that is deposited in the pipes, valves, and on the walls of the product tank. This crystal contains 90 percent phenol, 0.3 to 0.4 percent caustic lye of soda, and some sodium carbonate. The most feasible method for eliminating this phenomenon seems to be to produce a phenolate solution containing 10 to 12 percent phenol and to use the solution obtained in the dephenolization process (it still contains free caustic lye or soda) for the dephenolization of the tar oil in the tar processing plant, once the latter is placed into operation. In this manner the phenol content can be raised to 20 to 22 percent, which makes transportation to the processing plant feasible. This solution has been included in the plan.

In this brief report I wished to sum up the difficulties which we encountered in placing the benzol recovering plant into operation, and to outline the measures we introduced to eliminate these difficulties, including some measures that have not produced final results. Our coming tasks in connection with the specific investigation of the existing shortcomings are clear. In addition to the elimination of these shortcomings, we must also strive to ensure economical operation. The compilation of material and power norms for this purpose is already under way. Naturally, we must also place emphasis on raising the efficiency of recovery and on improving the quality of the products, whereby we can substantially reduce the cost price of blast-furnace coke. Furthermore, we must strive to develop methods for the production of products that are more valuable. The conditions of operation permitting, we must try out these methods in full-scale or pilot plant experiments. In this respect we have already made considerable progress. Here I have in mind primarily the extraction of hydrogen cyanide from ammonium thiocyanate, which will start this year (1958); the pyridine refinery that will be placed into operation early in 1959; the production of ammonium chloride and diammonium orthophosphate in the distant future; and possibly also the extraction of ethylene.

## ELECTRICAL POWER ENGINEERING IN POLAND AND PROSPECTS OF ITS DEVELOPMENT

Following is a translation of an article  
written by S. I. Minorski in Elektricheskiye  
Stantsii (Electric Power Stations), Vol. XXX,  
No. 12, Dec. 1959, pages 66-71, CSO: 3439-N 7

As a result of the development of the Polish national economy during the postwar period, electrical power plants with a total capacity of 3,787 megawatts were built, reconstructed (including electrical power engineering of the western territories), and put into operation. The installed electrical capacity increased from 1,692 megawatts in 1938 to 5,570 megawatts in 1958. At the same time, the generation of electrical power for that period increased from 3.97 to 24 billion kilowatt-hours.

The growth of electrical power generation and installed capacity of Polish electrical power constitutes a characteristic feature of its dynamics. In its resolutions, the Third Congress of the Polish United Workers' Party established the production of electrical power for 1965 at 43.5 to 45.0 billion kilowatt-hours (see Fig. 1).

At present, Polish power engineering presents a highly ramified power system whose electrical power networks embrace the entire country. The unified electrical power system of the country (Fig. 2) connects about 250 electrical power plants, including 25 major thermal stations (which are the foundation of the system) operating on pit and brown coal and generating about 90 percent of all the electric power.

The electrical power networks of the country consist of 220, 110, 60 and 1 kilovolt power transmission lines and low voltage power networks. Towards the end of 1958, the expansion of the above lines and networks reached 220 kilovolts - 800 kilometers; 110 kilovolts - 7,000 kilometers; 60 kilovolts - 90,000 kilometers; < 500 volts - 120,000 kilometers.

At the beginning of 1959, the Polish electric power system underwent a stage of reorganization. This resulted in a drastic reduction of the administration apparatus; it simplified the management of enterprises and raised the quality and productivity of power personnel.

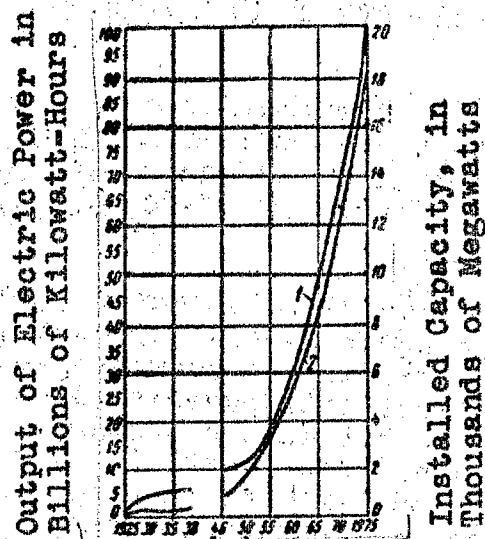


Fig. 1. Growth of installed capacity and generation of electric power in Poland during the 1925-1975 period.

1. installed capacity.
2. generation of electric power.

POWER DISTRICT	ELECTRIC POWER OUTPUT					CAPACITY, PERCENT				
	1950	1955	1960	1965	1950	1955	1960	1965	1950	1965
Central	12.4	11.6	13.4	11.5	13.4	12.3	14.5	13.8		
Eastern	6.2	5.6	7.1	4.6	7.8	6.5	7.8	5.4		
Southern	58.5	61.8	59.8	45.0	47.5	55.2	51.1	41.0		
Lower Silesian	10.7	7.9	7.2	22.3	14.8	10.8	8.0	17.7		
Western	5.5	7.3	7.9	13.2	7.5	8.2	11.6	16.3		
Northern	6.7	5.8	4.6	3.4	9.0	6.6	6.7	5.8		

Table 1

At present, the country's entire electrical power engineering system is run by the Ministry of Coal Industry and Electrical Power Engineering, and administered through the Power Engineering Association. The country's territory is divided into six power districts having their own electrical power enterprises, which comprise electrical power stations, network areas, and repair plants. These districts represent local electrical power systems with highly diversified network configurations and irregular distribution of generated power. More than one half of the capacity is centralized in the southern power district, which comprises the major industrial regions of Upper Silesia and the Krakow Wojewodztwo.

The distribution of the capacities and electrical power output in percent and according to the individual power districts is presented in Table 1.

It is seen from Table 1 that the Lower Silesian and Western Power Districts indicate a considerable growth in capacity and electrical power output for the 1960-1965 period. This is explained by the construction in those districts of new electrical power plants operating on brown coal.

One of the basic features of Polish electrical power engineering in the present time is the predominance of thermal electric power stations operating on pit coal. Their capacity constitutes 98.6 percent of the total capacity of all thermal electric power plants. The capacity of hydroelectric power stations totals 5.4 percent, and their output of electric power is four percent of the total power production.

The development of the electrical power system is characterized by the relative growth of the share of electrical power plants in general use. The installed capacity of these electrical power plants increased from 50 percent in 1946 to 70 percent in 1958. At the same time, the output of electrical power in electrical power plants in general use has increased correspondingly from 48 to 75 percent.

Immediately after the war, obsolete and uneconomic equipment was predominant in the plants. Towards 1958, the average electrical power output in obsolete [old] electrical power plants dropped.

The share of old, modernized, and new thermal electrical power stations in general use in the production of electrical power amounts to the following (in percent of total output):

	1950	1958
Old electrical power stations	70.6	9.9
Modernized electrical power stations	29.4	42.5
New electrical power stations	0	47.6



The technical level of power facilities [equipment] introduced during the 1950-1958 period is characterized by the installation of boilers -- first of medium, and then of high parameters -- without intermediate superheating, as well as by the application primarily of condensing steam turbine-generator sets of 25-megawatt capacity.

The introduction of new, more advanced equipment and techniques during the 1961-1965 five-year period is characterized by the application of super high-pressure, intermediate superheating boiler-turbine block systems, and also by the installation of high capacity equipment. For example, the 100-megawatt turbine-generator set put into operation in 1958 may be cited. The installation of 70-megawatt turbine-generator sets is underway in one of the electric power plants. Their initial steam parameters are 181 absolute atmospheres and 530°C, with 525°C intermediate superheating and a boiler capacity of 237 tons per hour.

The introduction of new power generating equipment with higher steam parameters and higher efficiencies, as well as the modernization of existing electric power plants, will raise the general technical level of Polish power engineering. The dependence of the capacity structure on the steam parameters in the 1950-1975 period (Fig. 3) introduces a very interesting subject.

Electric power stations put into operation during the past few years already employ domestically produced boilers with the following characteristics: capacity, 230 tons per hour; steam pressure, about 110 absolute atmospheres; temperature, 535°C. At present, the Polish industry is proceeding with the production of boilers designed for block operation with 126-megawatt turbines. They are manufactured under a British license and have the following characteristics: capacity, 375 tons per hour; steam pressure, 127 absolute atmospheres, and temperature, 530°C.

For the 200-megawatt turbines of Soviet manufacture, which will be installed at the Turow Electrical Power Station, the Polish industry will provide boilers with the following operating characteristics: capacity, 650 tons per hour; steam pressure, 162 absolute atmospheres; temperature, 540°C with 540°C intermediate superheating. The domestic industry also produces 25- and 50-megawatt turbines for parameters of 90 absolute atmospheres and 515°C.

An index of technical progress may also consist of the growth of the net efficiency of electric power stations, which, on the average, increased from 14.5 percent in 1950 to 21 percent in 1958.

The state of automation governing thermal processes and the operation of boiler equipment in electric power stations in 1958 is shown in Table 2.

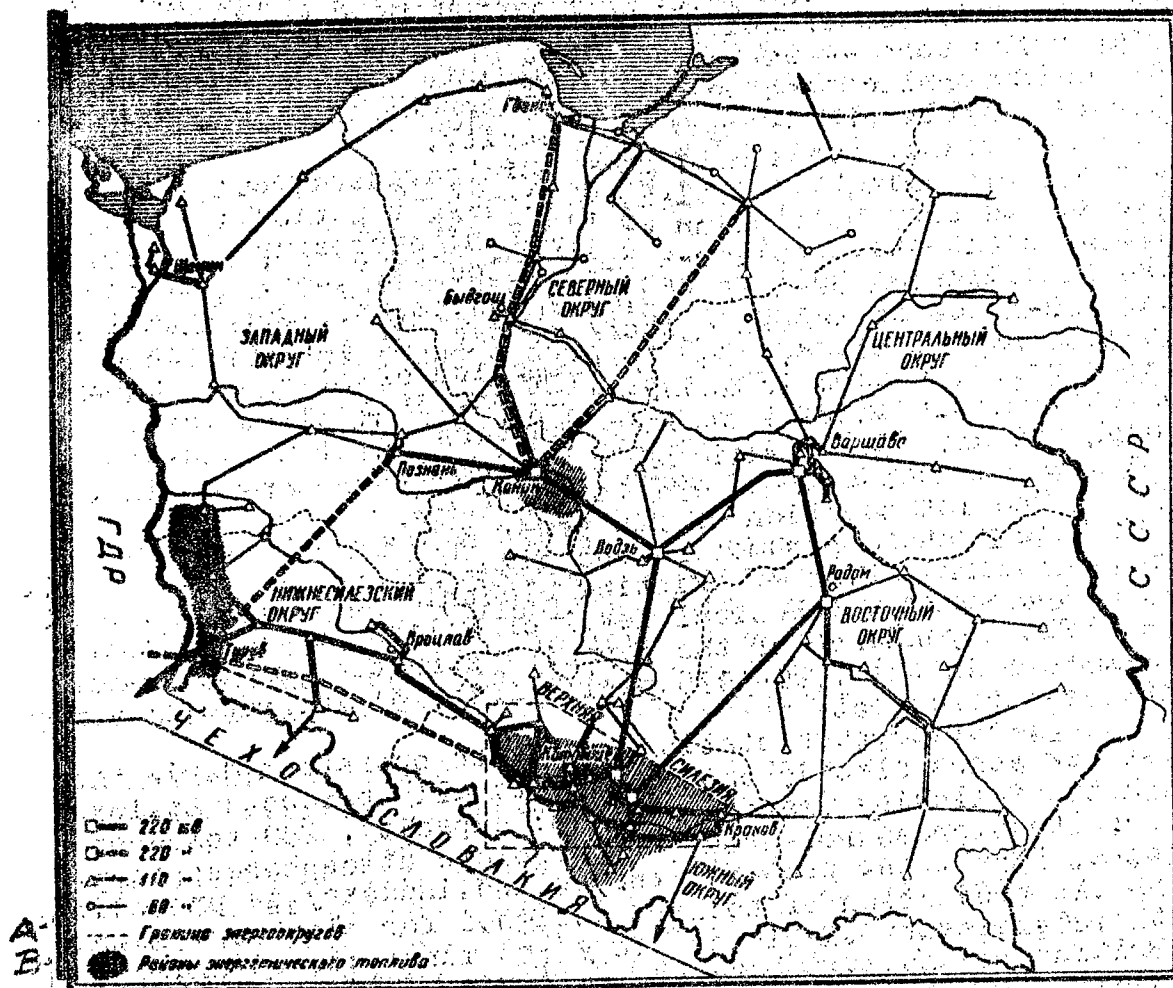


Fig. 2. Electric power system [network] in the People's Republic of Poland.

- A. Boundaries of electric power districts.  
 B. Regions of raw-energy sources [fuels].

Table 2

Extent of Automation	% to total number of boilers	% to total boiler capacity
Full automatic performance	30.9	40.6
Partial automation	17.5	38.7

Note: 92 % of the coal unloading and 65 % of the ash removing operations are mechanized.

A total of 95 percent of transmission line switchgear which lends itself to automation operates automatically, and 53 percent of emergency switching equipment is automatic.

A great achievement in Polish electrical engineering is the consistently decreasing specific fuel consumption [grams per kilowatt-hour] in pit coal-operated electric power plants. This drop results from the introduction into production of more advanced equipment, and also from the modernization of old electric power plants. In 1958, the specific consumption of conventional fuel for electric power stations in general use reached 520 grams per kilowatt-hour.

The reduction curve of the specific consumption of conventional fuel per kilowatt-hour generated in the 1950-1958 period, as well as in the 1965-1975 plan, is presented in Figure 4.

According to that index, the individual thermal electric power stations achieved good results. The specific fuel consumption in 1958 was as follows: in the Zeran heat and electric power plant (110 absolute atmospheres, 510°C) -- although a by far insufficient heat emission -- to 426 grams per kilowatt-hour (Fig. 5); Jaworzno II electric power plant (110 absolute atmospheres, 510°C) -- 455 grams per kilowatt-hour; Blachownia electric power plant (96 absolute atmosphere, 510°C) -- 402 grams per kilowatt-hour (Fig. 6); Konin electric power plant (Fig. 7) operating on brown coal (80 abs. atm., 510°C) -- 464 grams per kilowatt-hour.

The consumption structure of electrical power changes with the country's economic development and the prosperity of the people. There exists a growing demand for consumer goods on the part of city dwellers and the rural population (Table 3).

This unified electrical power system operates under stress, a fact which is apparent from the number of maximum utilization hours:

Table 3

Consumer	Electric Power					Consumption			
	1950	1955	1960	1965	1970	1975			
Industry	82.2	81.2	77.8	73.3	70.8	65.5			
Transportation	0.3	0.8	2.7	3.5	4.0	4.9			
Cities	13.5	13.6	14.3	17.1	18.3	21.1			
Rural Areas	4.0	4.4	5.2	6.1	6.9	8.5			

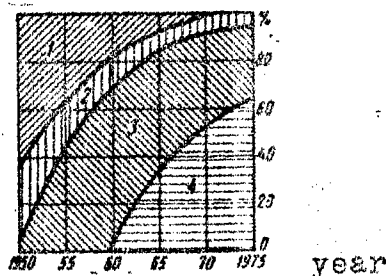


Fig. 3. Capacity structure in electric power plants in general use & its dependence on steam pressure.

1. Steam pressure <20 abs. atm.
2. Steam pressure 20-60 " "
3. Steam pressure 60-110 " "
4. Over 110 abs. atm. with intermediate steam superheating.

Grams par kilowatt-hour

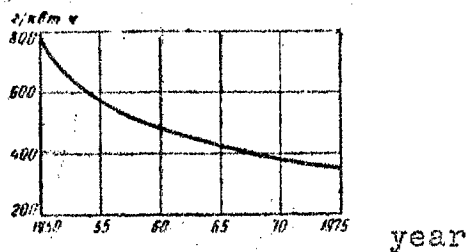


Fig. 4. Unit consumption of conventional fuel per kilowatt-hour in electric power plants in general use.

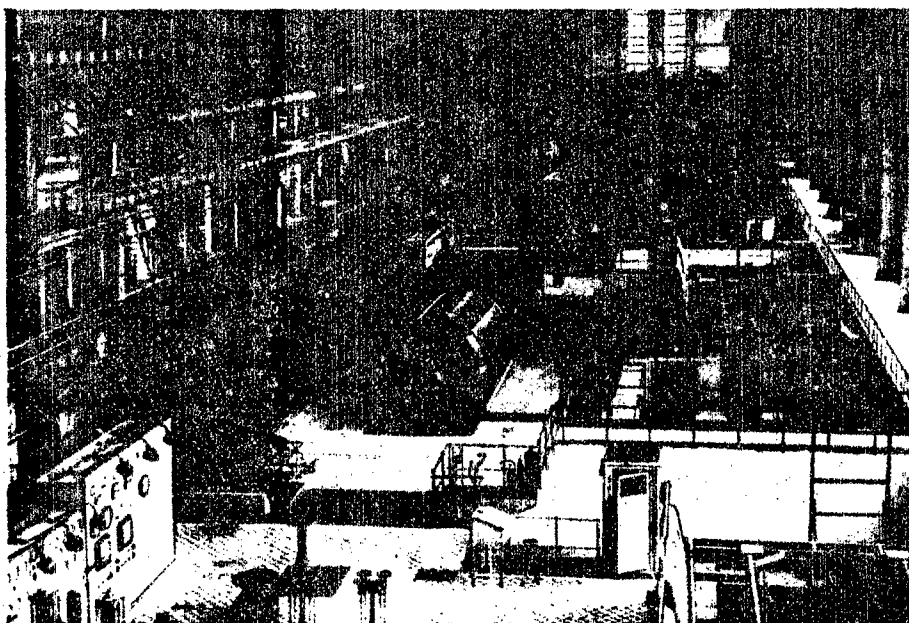


Fig. 5. Engine room at the Zeran heat and electric power plant.

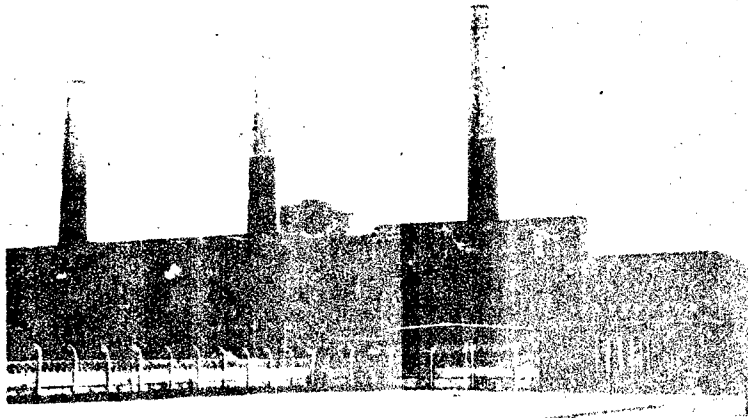
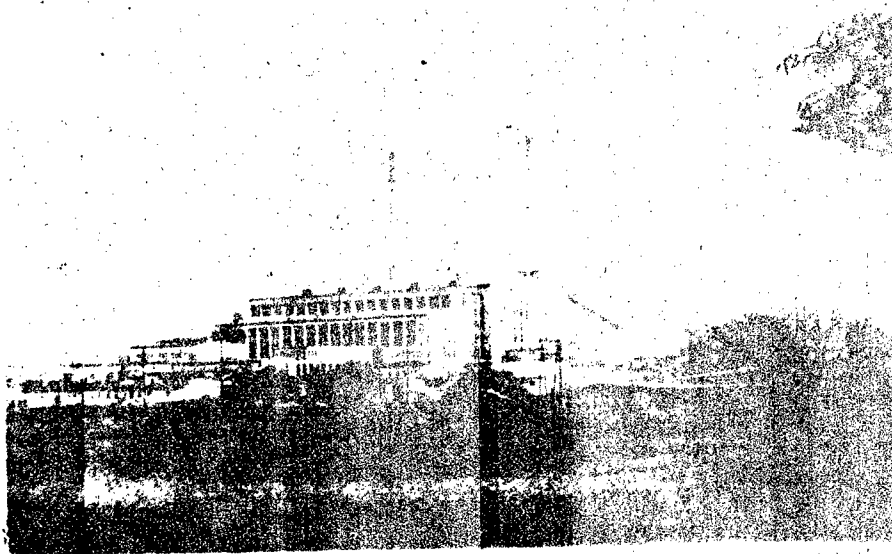


Fig. 6. Blachownia Electric Power Plant.



Brown coal-operated Konin Electric Power Plant.

<u>Years</u>	<u>Number of Maximum Utilization Hours</u>
1950	5,700
1955	5,850
1960	5,600
1965	5,450
1970	5,400
1975	5,370

The electrification level in bourgeois [prewar] Poland was extremely low. Compared with West European countries, prewar Poland occupied one of the lowest positions in terms of per capita electrical power consumption. The consumption of electrical power sharply increased after the war. Data on the growth of per capita electrical power consumption during the 1950-1975 period are presented below:

<u>Years</u>	<u>Per Capita Power Consumption Kilowatt-Hours Per Capita!</u>
1950	350
1955	600
1960	900
1965	1,240
1970	1,580
1975	2,070

In 1958, the per capita consumption of electrical power reached 842 kilowatt-hours, a figure which exceeds the 1938 level by eight times. It is important to note that the average world index increased three times during the same period, and only slightly over twice in Europe. At present, the People's Republic of Poland occupies the eighth place among European countries in the consumption of electrical power.

The People's Republic of Poland is one of the few nations that are rich in pit and brown coal. These fuel resources, in terms of electrical power, are estimated at 1,170,000 billion kilowatt-hours and give Poland the fourth highest rank in Europe. At present, pit coal is still the major fuel source used for the production of electrical power in Poland.

During the current five-year period (1956-1960), the use of brown coal extracted by the open-cut method was introduced (in Central Poland); the use of brown coal is expected to increase considerably during the next 5-year period (1961-1965).

Table 4

Raw Energy Sources	Generation of Electrical Power, in Percent					Installed Power, in Percent				
	1955	1960	1965	1970	1975	1955	1960	1965	1970	1975
Pit coal	95.3	93.3	68.0	49.7	43.1	93.8	91.9	76.9	61.7	54.7
Brown coal	0.7	4.6	28.4	42.0	44.8	0.5	4.3	17.7	28.2	31.4
Water power	4.0	2.1	3.6	4.8	6.4	5.7	3.8	5.4	7.9	10.2
Nuclear power	—	—	—	3.5	5.7	—	—	—	2.2	3.7

A characteristic feature of Poland's electrical power system in 1965 will be the presence of three major electrical power producing regions. Two of these regions are new and will use brown coal (Konin and Turon) and the third -- an old region -- pit coal (Upper Silesia). These regions are shown in Figure 2.

The changes which take place in the structure of electrical power production and the relation of installed power to raw energy sources are shown in Table 4.

It is apparent from Table 4 that the generation of electrical power by means of brown coal will grow at a considerably higher rate than the installed capacity. As a result, the electric power plants operating on brown coal will become the basis of the electrical power system and will have a higher utilization factor [more utilization hours], compared with pit coal-operated electric power plants.

The following brown coal-operated electrical power plants should be mentioned: in the Konin region -- Konin, capacity 465 megawatts; Adamow, 480 megawatts, and Patnow, 500 megawatts; in the Turon region -- Turon of a first order capacity of 1,200 megawatts. The construction of brown coal-operated electrical power plants will continue after 1965. The broad application of brown coal not only reduces the production cost of electrical power but, at the same time, also permits the economizing of pit coal.

The long-range plan for the development of electrical power engineering calls for further construction of pit coal-operated electrical power plants, whereby priority will be given to the full utilization of coals of fuel value and wastes. The planned electric power plants will be constructed in the vicinity of coal mines. Among these power plants are Chaleba, capacity 200 megawatts; Lagisza -- 500 megawatts; and also the modernized Chorzow and Zabrze electric power plants.

The 200-megawatt Pomorzany power plant to be operated with coal brought in from other places is under construction in the Szczecin area.

After the war Polish electrical power engineering introduced the construction of heat and electric power plants. At present, several such power plants are in operation



throughout the country, and a number of others are either in the planning stage or under construction.

In Warsaw, the old modernized 95-megawatt Warsaw heat and electric power plant, as well as the 260-megawatt Zeran heat and electric power plant constructed according to Soviet plans, are already in operation. The 200-megawatt Siekierki heat and electric power plant is under construction. In this way, the entire city will be enveloped in a centralized heat supply system. In Lodz, the construction of a 150-megawatt heat and electric power plant is nearing completion. In Wroclaw and Bydgoszcz, the conversion of old steam condensing electric power plants into heat and electric power plants is under consideration.

The nation's water power resources, amounting to approximately 2,200 megawatts, are relatively low. These raw-energy sources are divided into three basic groups: the Vistula Basin -- of the order of 1,200 megawatts; the major rivers -- about 250 megawatts; and accumulation [or pumped storage] electric power plants with a total capacity of about 800 megawatts. At present, the maximum capacity of a hydroelectric power station (Roznow and Dychow) amounts to 50 megawatts. The electric power system includes a total of 120 additional minor hydroelectric power plants having a total capacity of 150 megawatts.

Two waterfalls, one on the Lower Vistula with a total capacity of 800 megawatts, and a second -- of a 200-megawatt capacity -- on the Dunajec River, are especially valuable in terms of construction, as well as from the economic viewpoint. The construction of a 160-megawatt hydroelectric power station at Wloclawek as part of the Lower Vistula Project has been given priority. Likewise, the construction of the 80-megawatt Solina hydroelectric power plant on the Upper San River is being planned. Moreover, a 50-megawatt hydroelectric power plant on the Brda River is under construction.

The possibility of constructing several accumulation electric power plants is under consideration.

It should be noted that the construction of hydroelectric power plants is two to three times more expensive than that of thermal plants, and that it is expedient only in cases when the water flow can be regulated at the same time.

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FOR REASONS OF SPEED AND ECONOMY  
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